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School Zone:
A New Model for Suburban Development in Montana

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School Zone:
A New Model for Suburban Development in Montana

by

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Report

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Dedication

To Montana, so our story might not be
that we wasted the wealth of our land and people.

Acknowledgements

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Thank you to my friends who spent two- and three-years studying cities with me. Thank you to Jake Wegmann, who is, hands down, the best professor in the School of Community and Regional Planning. His guidance was vital to any success this report may meet. This time with all of you at UT has been a treasure.

Thank you to my parents and family who taught me to love and work. Thank you to my beautiful, loving wife, Virginia, who supports me every day as I tilt at windmills.

Abstract

School Zone:
A New Model for Suburban Development in Montana

John A. Halverson, MSCRP+MSUD

The University of Texas at Austin, 2020

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"The last, best place," Montana, has experienced sustained, rapid population growth in recent years. Millennials and Baby Boomers alike flock to the state to stake their claim on some of the last remaining housing markets that offer what many perceive as the "American Dream" of an affordable, suburban home in a small town. This population growth has sparked extensive suburban development throughout the state, prompting many public-school districts to build new facilities to accommodate this growth. Contemporary school siting practices favor large sites, which are usually found only at the edges of existing development. Once built, these new facilities attract home builders and families, further catalyzing suburban sprawl development (Beaumont and Pianca, 2002).

This dynamic represents a classic "tragedy of the commons" case for government intervention at several levels. Continued, uncoordinated growth threatens the character of Montana cities. Contemporary suburban development patterns contribute to traffic safety hazards and congestion. The desirability of small, county schools drives population growth, pushing cash-strapped school districts to their limits.

This report explores, through case studies, the ways in which status quo school siting (site acquisition) practices, local regulations, and legislation all contribute to fiscally unsustainable and dangerous suburban development patterns. The final chapter proposes a "School Zone" tool that coordinates local jurisdictions (city, county, school district) to leverage public investment in new school facilities as a means of creating more fiscally sustainable, compact, adaptable suburban development that provides a steadier student population, and safer cities in which those children might live.

Table of Contents

List of Figures

Chapter 1: Introduction

It was only 5:40, but the sun had already set on the cold, January evening as Dustin Freese and a friend walked home on Becraft Lane in Lockwood, just outside of Billings, Montana (Irish, 2013). As the boys made their way along the narrow shoulder, between the road on their left, and the piled snow and ditch to their right, they may have talked about playing video games later that evening, or the paddle fishing, paint balling, and prairie dog hunting that the warmth of summer would surely bring. Those were, according to Dustin's obituary, some of the things that he loved to do (Dustin Patrick Freese, 2013).

Dustin never saw another Montana summer. Without warning, a Chevy pickup driven by 71-year-old Wallace Bradberry struck Dustin Freese, a high school sophomore, and killed him at the age of 16, ending his life and whatever dreams he or his family had for his future. Montana Highway Patrol would describe the incident as, ". . . a tragic accident . . . a "perfect storm" of circumstances lasting no more than ten seconds" (Tuttle, 2013).

Mr. Bradberry did not mean to kill anyone that evening, but Dustin's death was no accident. It was the statistically predictable outcome of a combination of policy, design and engineering decisions made at the federal, state and local level; those decisions which create the political and physical environment that we know and experience as a city. Both Dustin and Mr. Bradberry acted rationally that evening, given the range of behaviors that their city allowed.

For senior citizens like Mr. Bradberry, Billings, like most American cities, requires that they either drive, or completely relinquish their autonomy. Americans are now outliving their ability to drive safely by an average of seven to ten years. According to the

AARP, there is a, “substantial rise in crash incidence” in drivers over 70 (Houser, 2015). Faced with the decision, Mr. Bradberry followed the incentives given to him by his city, and took the risk of driving, as any reasonable person would.

Dustin Freese chose to walk down the shoulder of the road because there were no sidewalks on Becraft lane, a well-used pedestrian route and known safety hazard in Lockwood. The posted speed limit on Becraft at the time was 35 mph. A person struck by a car at 30 mph is about 70% more likely to be killed than a person struck by a car at 25 mph (Schmitt, 2016). In 2017, over 37,000 Americans were killed, and another 2.7 million injured, in traffic crashes (NHTSA, 2019). Our nation’s traffic fatality rates are twice those of any comparable, developed nation (CDC, 2016). And Montana is no different. In 2017 Montana was the 7th most deadly state in the union by fatalities per vehicle mile traveled, (NHTSA, 2019). Yet professionals both public and private continue to build cities around and for the car, which consistently results in tragedy.

From the time that the automobile was introduced in the early 1900’s it has killed children in droves (Lange, 2018). Papers at the time even referred to the car as a “Modern Moloch,” a god to whom the ancient Ammonites may have sacrificed their children (Dukes, 2013). In reaction to this carnage, Americans took the understandable action of removing children from the street and the city, corralling them into what they began to call playgrounds. Chapter five of this report explains how this well-intentioned separation eventually grew into the age-segregated, motor city of today, where the world of children is confined to a shrinking area of safety around their home, school, and whatever formal activities their parents can afford to chauffer them to and from. In the age-segregated, motor city, the ability to own and operate a car is the pre-requisite to autonomy and freedom of movement (Duany et all, 2010).

The influence of the automobile on American cities is difficult to overstate. Streets, homes, commercial, office, and civic uses have all made room to accommodate it. Public schools have bloated and consolidated their sites to prioritize the combination of car trips rather than allowing universal access to schools by children on foot or bicycle. Because children can no longer safely spend the hours after school playing freely in their neighborhood, for fear of being killed or injured by a car, parents understandably demand that districts include vast athletic fields in any new school facility. All around the nation, large-acreage school sites, available only at the outer edge of development, serve as the "advanced scouts" of suburban sprawl, proliferating the cycle of motor dependence (Beaumont and Pianca, 2002).

In addition to the unacceptable human toll of the car-dependent city, a growing body of evidence suggests that the cost of maintaining the miles of road, water, sewer and services to inhabitants of the motor city is fiscally unsustainable for local governments. A series of interviews with local school district and city officials revealed pervasive "tax fatigue" among Billings residents whose property values cannot support the quality services they desire. Chapters three, five, and six of this report include analysis of different suburban development types and the value per acre that they generate. Findings include a wide range in value from county to city developments of varying density.

Chapter two frames these challenges within their broader context in terms of the demographic and economic trends playing out across the nation and Montana. Chapters three and four study Billings School District #2 and Elder Grove District #8, through the lens of their efforts to accommodate and plan for growth. These chapters include analysis of their developing surroundings, and the looming maintenance obligations and complications that will result from continued development of its like.

Chapter five explores how growth in this area will, in the next 20-50 years, pepper 11,000 acres of productive agricultural land with thousands of privately-maintained wells and septic systems. In that time, a number of these wells will drop, and septic systems fail, cross-contaminating a number of neighboring wells. Without the continued economic growth that this development has bet on, the outlook for its maintenance liability is bleak.

Chapter five parses the fragmented governance that produces the patchwork of infrastructure on Billings' West End and how contemporary development brings about "tax fatigue" and forces these jurisdictions to rely, and bet, on continued growth to support themselves.

Chapter six studies several examples of attempts at building neighborhoods around schools abstractly and in the real world. It then returns home to Billings to observe local subdivisions that carried on those themes, and how they might show a way forward.

Lastly, Chapter seven details a proposed "School Zone" growth management tool that leverages the investment and influence of public schools on their surroundings to create a neighborhood center around which value and community can begin to agglomerate. The "School Zone" includes proposals for school site acquisition best practices, subdivision requirements, and other policy changes that envision the city as an armature for investment not only in physical capital, but in the human capital of our children as well.

In 2014, after the death of Dustin Freese, the unincorporated community of Lockwood rallied to create the Lockwood Pedestrian Safety District (Rogers, 2019). The Special Improvement District will fund the construction of sidewalks on targeted pedestrian routes, giving residents the option to safely make trips on foot. Ten miles west of Lockwood, in the quickly-developing area around the Elder Grove public school campus, Yellowstone County government is again unable or unwilling to invest in the

safety of its children by building sidewalks, even on those streets fronted by the school. Again, the outcomes of this situation are predictable, costly, tragic, and preventable. When yet another child is killed in a traffic crash on a road without sidewalks, will we blame the parents for not being more attentive? Will we reassure ourselves that "these things just happen," that another "perfect storm" has rolled through town and taken another life? Or will we acknowledge our role in building the physical and political systems that require pedestrian deaths, costly infrastructure, and the destruction of our natural heritage as the cost of doing business? In fifty years, when our children sit where we do now, will they face the problems we could not solve, and so deferred to them, or will they thank us for our stewardship and willingness to make tough decisions for their sake?

Chapter 2: State and National Context

Relevant Trends in the United States

Until the recent COVID 19 outbreak, the prevalent trend playing out in American cities was the "Great Inversion," the name given to the return of affluent Millenials and Baby Boomers to the city (Ehrenhalt, 2012). The Millenial generation is the largest of any to date, and their increased presence in cities is the product of three cycles. The first cycle is the demographic wave of Millenials, those born from 1980-1999, reaching its peak in 2015 as the largest cohort reached the age of 25. This generation exhibits a strong preference for urban living, a reduced preference for automobility, and high rates of college education (Myers, 2016).

According to Dowell Myers, of the Sol Price School of Public Policy, the economic influence of the great recession on the Millenial generation is the second cycle influencing their presence in cities. As the recession slowed job growth and constricted housing production, Millenials were forced to compete for entry-level jobs and housing with older cohorts already in place. Because those older cohorts were themselves unable to move on into later life-cycle stages of housing, "demographic crowding" left many Millenials "stuck in place" in rental or shared housing and unable to move on into later housing stages of early-middle age (Myers, 2016).

The third and, for this report, most important cycle that amplifies the presence of Millenials in the city is the large cohort's journey through normal life cycle housing stages. This refers to the life cycle journey of living with one's parents, then alone or with roommates in cheaper, or rental housing, and finally entering larger housing units in early-middle age as earning power and the needs of a family increase. After years of sustained

economic expansion (until the recent crisis) a majority of Millenials are now shifting into that last stage of housing.

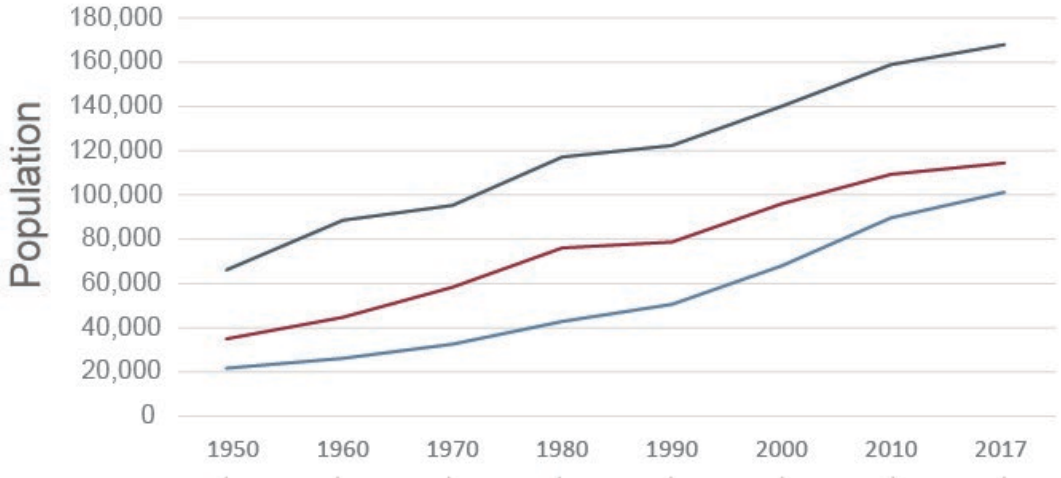
As the Millenial generation enters early middle age and searches for better housing, they will have a high level of locational freedom in choosing where to live (Diamond, 2016). Both skilled workers and the firms seeking to attract those workers will consider factors including walkability, access to cultural and social amenities, and the quality of urban services like transit and schools (Florida, 2005). This suggests a threshold of diminishing returns to the low-tax, business-friendly model of economic development as the quality of services that Millenial workers value, like schools, begin to suffer from a lack of funding (Diamond, 2016).

New destinations like those cities in Montana wishing to compete for their share of Millenial workforce will succeed by prioritizing the aforementioned amenities and services that they value. Strategies include the development of urban villages that serve as focal points for gatherings both night and day, and as transit nodes. Recreational amenities like waterfront access and trail systems that provide the active lifestyle many Millenials value will also serve as attractants for a skilled workforce. As Millenials move into their late thirties and early forties, the quality of local school systems will become a leading priority in locational choice for this highly-educated, and mobile demographic (Myers, 2016).

RELEVANT TRENDS IN MONTANA

Once a sleepy backwater, rapid population growth and urbanization have come to "The Last, Best Place." Bozeman's population growth is so extreme that it now exhibits many of the same characteristics as many coastal housing markets with similarly-low levels of affordability, as part of the ongoing housing shortage across the country (Polzin, 2019). Although Montana's population growth has been relatively volatile when compared to the

national population growth rate, Montana's three largest MSA's have outpaced national population growth in almost every decade since 1950 (Figure 1.01).



Billings	31.3%	7.6%	23.0%	4.5%	14.3%	13.6%	5.4%
Bozeman	18.9%	24.8%	31.9%	17.7%	34.4%	32.0%	12.5%
Missoula	25.8%	30.5%	30.5%	3.5%	21.8%	14.1%	4.5%
Montana	14.2%	2.9%	13.3%	1.6%	12.9%	9.7%	4.1%
USA	19.0%	13.3%	11.5%	9.8%	13.2%	9.7%	4.0%

Social Explorer Tables: ACS 2017 (5-Year Estimates) (SE), ACS 2017 (5-Year Estimates), Social Explorer; U.S. Census Bureau

Figure 1.01: Population growth in Montana's three largest MSA's relative to state and national growth rates

When compared to the national population, Baby Boomers and older cohorts represent a disproportionately large segment of Montana's population. Providing services and housing to this age group as their health and mobility decline as well as filling their role in the workforce as they retire will be major challenges the state will face in coming years (Social Explorer, 2017). Figure 1.02 shows the large percentage of persons over 55 in Montana compared to that of the United States.

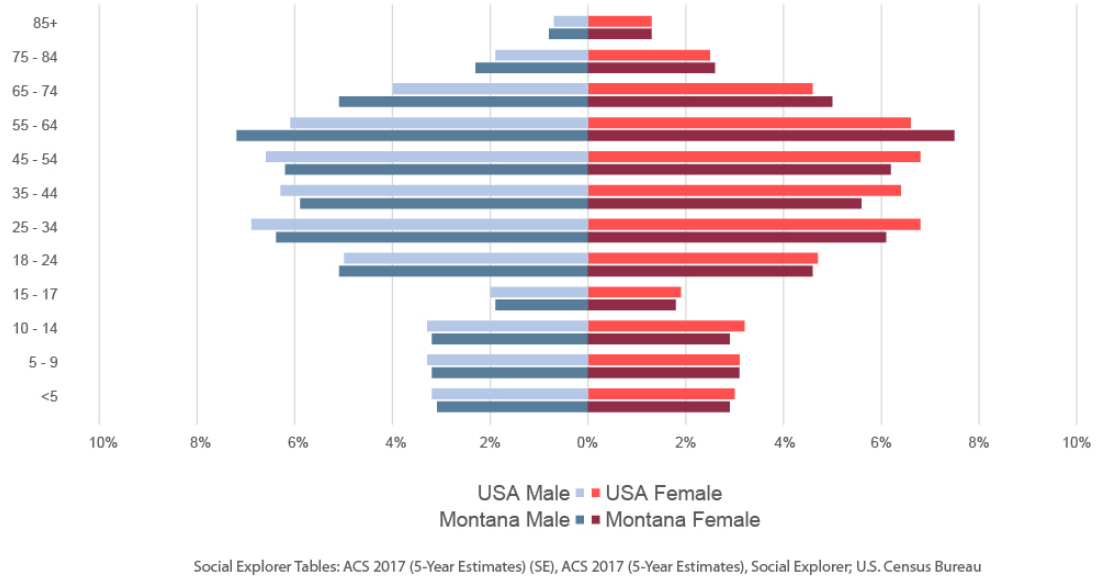


Figure 1.02: Population distribution by age in Montana compared to the nation

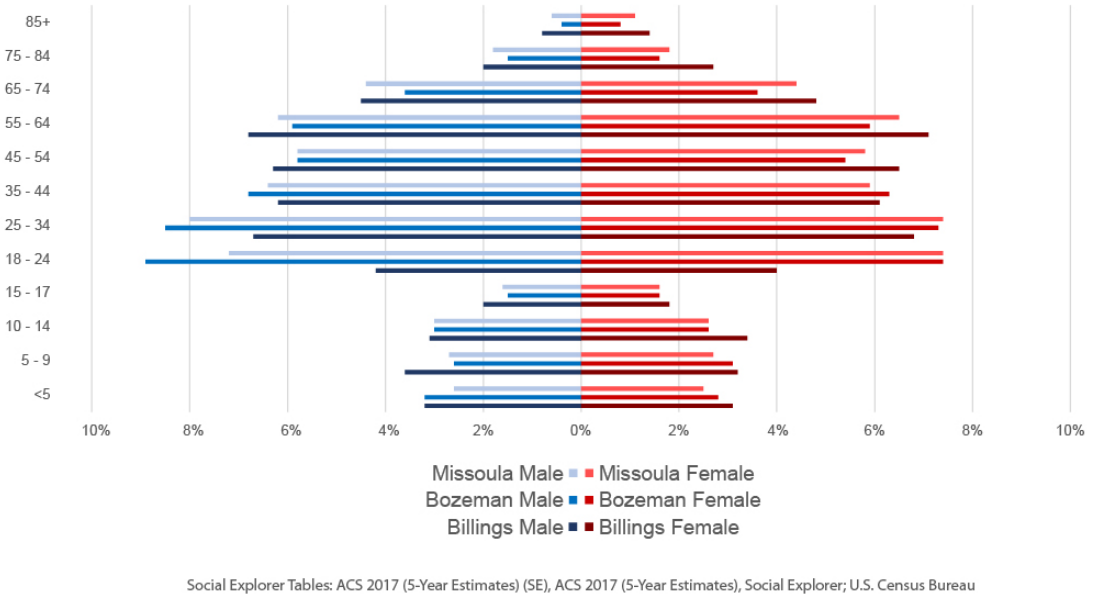


Figure 1.03: Population distribution by age in Montana's three largest MSA's

The aforementioned population and economic expansion has brought with it a decline in affordability in Montana's largest metros. Bozeman is, of course, the poster child of failing affordability, but both Billings and Missoula have also seen greater housing price growth since 2012 than half of a sample of comparable substate areas in the country (Figure 1.04). Montana's housing price index also surpassed that of the nation just before the great recession (Figure 1.05).

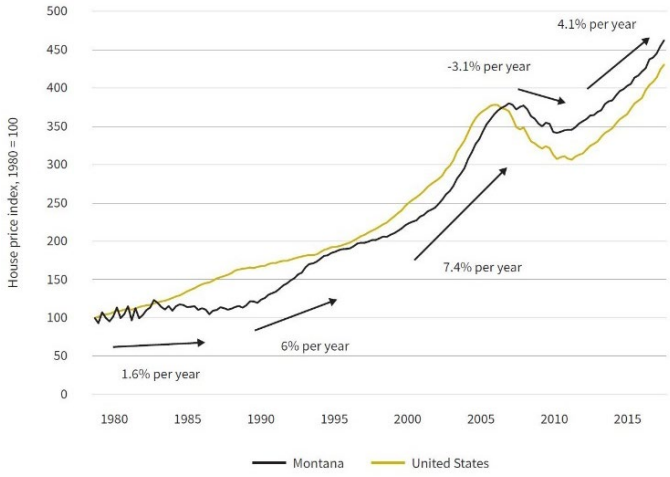


Figure 1.04: Housing price growth since 2012, with national rank. Source: 2019 Montana Economic Report

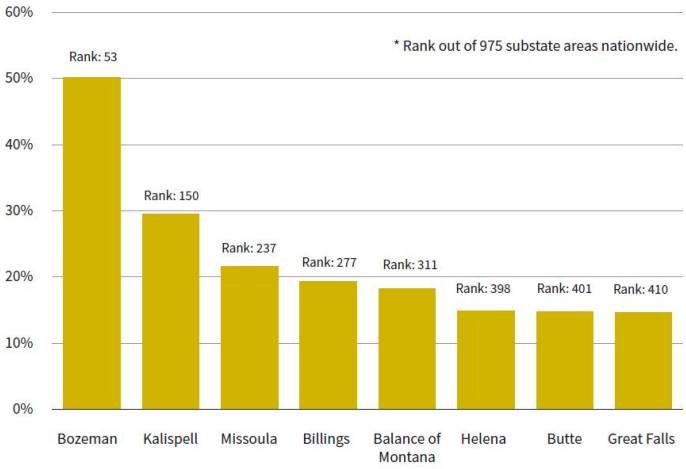


Figure 1.05: Housing price index, all transactions. Source: 2019 Montana Economic Report

To see the nation-wide trend of declining affordability reaching remote, rural places like Montana is troubling. Growth management mechanisms at governments' disposal now are statutorily hamstrung, and confined to a cultural discourse and identity stuck in the wild-wild west, in which land is cheap and abundant, and the state is ill-prepared to handle such cataclysmic growth.

BILLINGS, MONTANA

In the plains of central Montana, where the Yellowstone River long ago cut its path through the sandstone cliffs that bound the fertile river valley, the city of Billings spreads westward toward the Beartooth mountains. Unlike well-known Bozeman and Missoula, Billings is not a quaint mountain town. At the time of the 2017 American Community Survey, the Billings metro-statistical area (MSA), which contains Yellowstone, Carbon and Golden Valley Counties, (an area of about 6,000 square miles) was home to almost 170,000 Montanans, making this mostly rural MSA the largest urban area in the state (US Census Bureau, 2017).

High location quotients in oil and gas, medical services, and the city's position as a regional retail hub constitute the economic engine that was once considered among the most stable in the state. (Baker Tilly Virchaw Krause, 2019). Recent busts in the Bakken oil field (and certainly now given the decline in oil prices resulting from the global pandemic) have shocked the local economy, and reduced its economic standing among Montana cities to "middle of the pack" (Polzin, p9, 2019).

A report by Baker Tilly for Landmark Development Services, prepared as part the recently-abandoned "One Big Sky Center" project in downtown Billings paints a tepid picture of the city's economic prospects. It cites stagnant personal incomes, an aging workforce, high levels of part-time underemployment, and high unemployment in Billings' largest sector, the service and retail sector, as weaknesses in the city's economy.

In the next decade, 20% of Montana's labor force will retire (Baker Tilly Virchaw Krause, 2019). In that time, Montana cities will compete to attract those firms that create jobs for a highly-educated, highly-skilled, mostly Millenial workforce. Those workers will have an unprecedented degree of freedom in deciding where to locate. The quality of their children's education in any locality will be a primary factor in that decision. Success in attracting that Millenial workforce is vital to Billings' long-term economic development outlook. For Billings to compete with Bozeman, Missoula, and other cities for growth in high-wage sectors, it must proactively plan to attract high-wage firms, and build the high quality neighborhoods and city that those workers desire.

Chapter 3: Pride of the City: Ben Steele Middle School and Its Environs

School District #2, Billings, Montana

Yellowstone County is served by sixteen different elementary school districts that funnel into six high school districts (Figures 3.01, 3.02). As of January 2020, with 17,100 students, Billings School District #2 is the largest district, by student population, in the state of Montana, the next largest being that of Great Falls at a little over half its size (Office of Public Instruction, 2019).

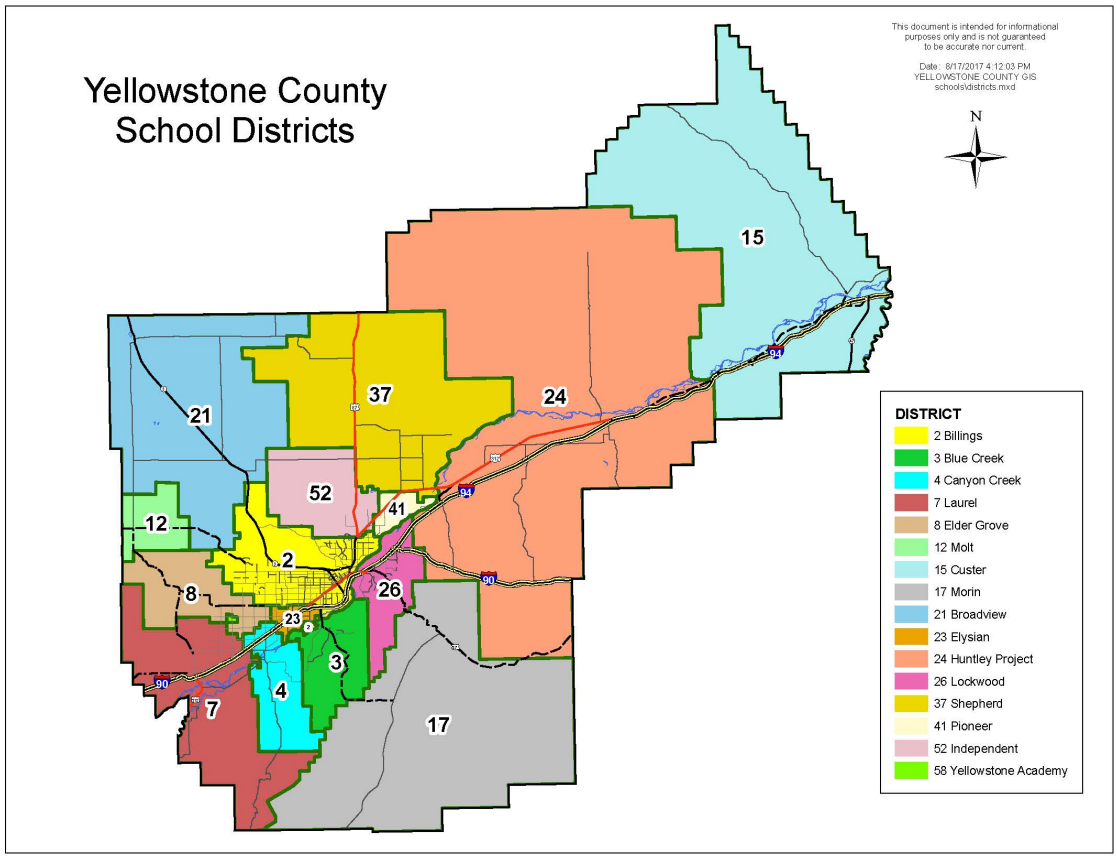


Figure 3.01: Yellowstone County Elementary School Districts, Yellowstone County, 2017

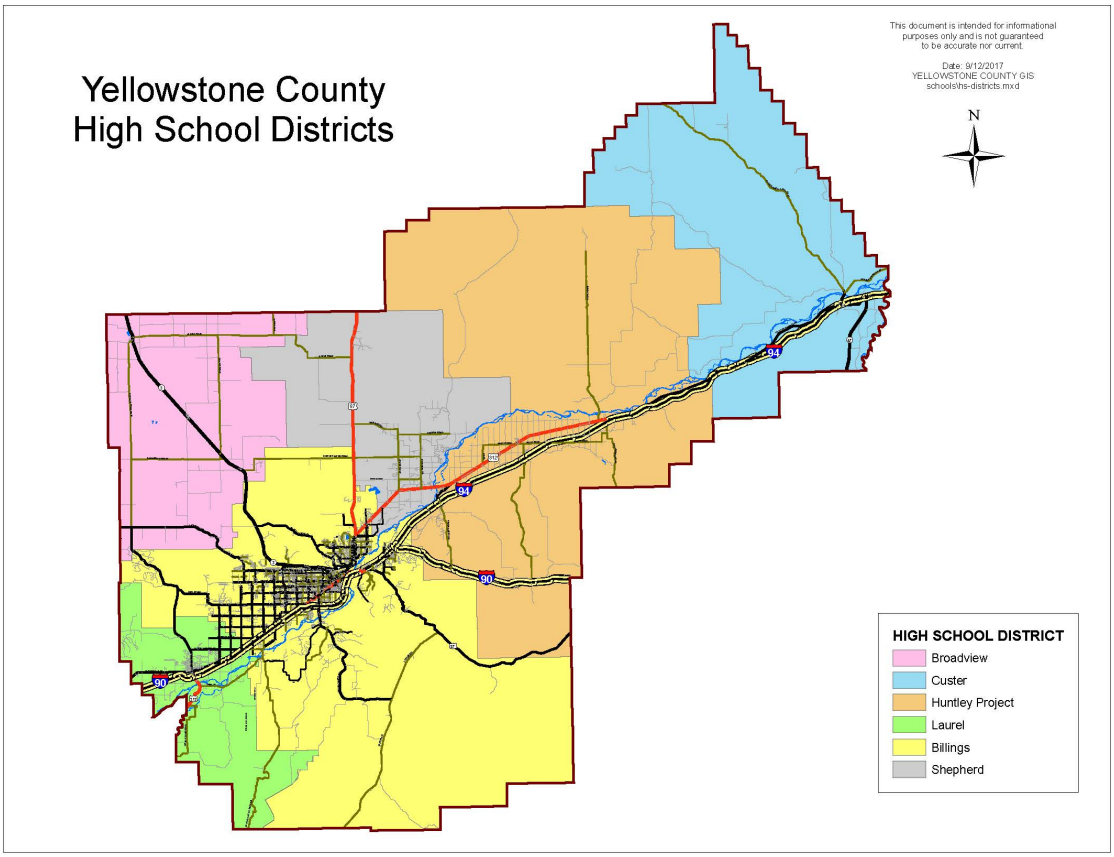


Figure 3.02: Yellowstone County High School Districts, (Yellowstone County, 2017)

The elementary district of Billings School District #2, whose operating budget is separate from that of the high school district, educates 11,453 of those students in twenty-eight different school facilities ranging in age of construction from McKinley Elementary, which was built in 1906, to Ben Steele Middle School, which opened for use in the fall of 2017 (Facilities Master Plan, 2018). These facilities follow the national trend of public school site acreage increasing over time (Figure 3.03).

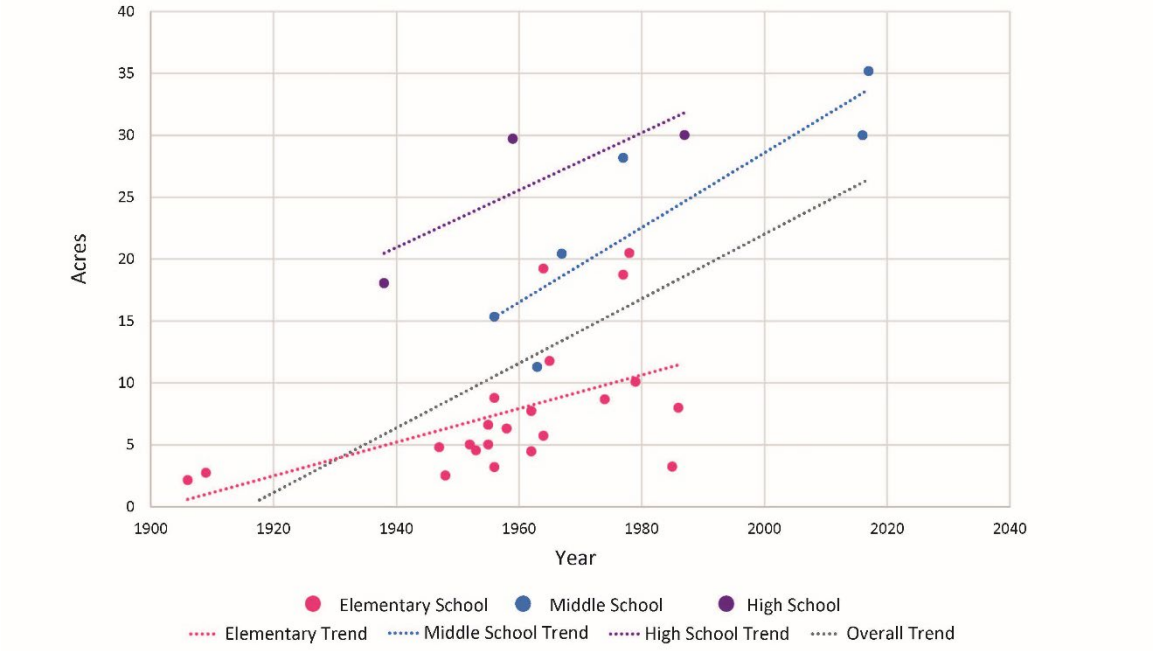


Figure 3.03: Billings School District #2 school site Area by year constructed

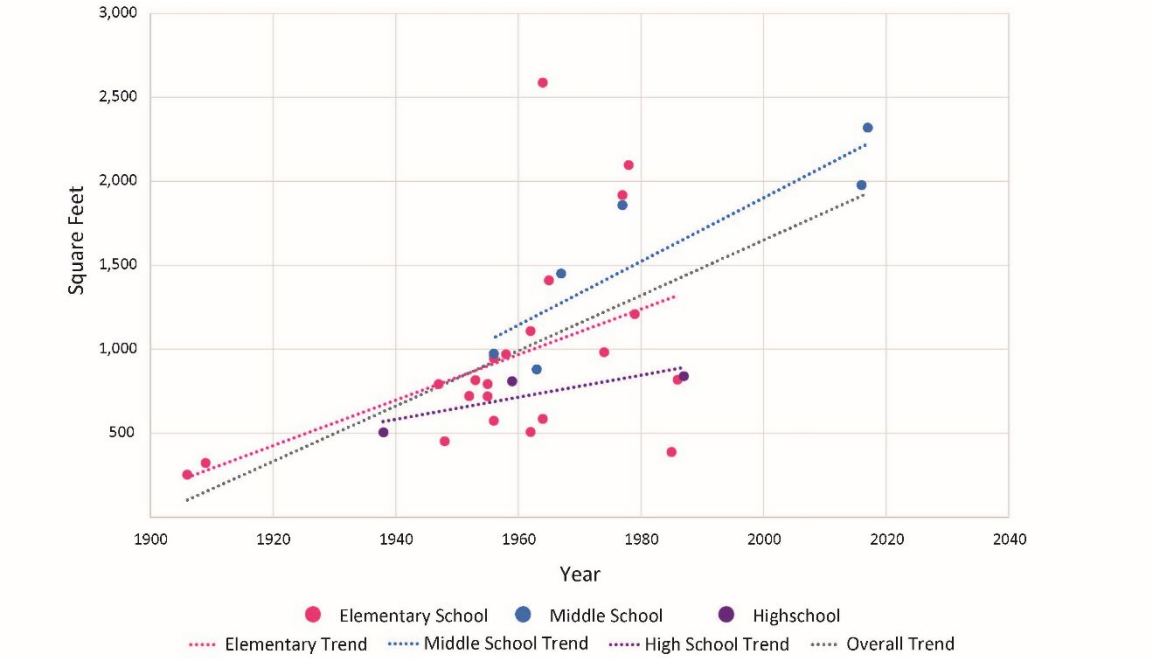


Figure 3.04: Billings School District 2 site area per target capacity student

This trend is not the result of schools growing to accommodate greater student populations, as the "target capacity" and built square footage of these schools has only slightly increased over the years, resulting in a significant upward trend in school site area per target capacity student (Figure 3.04).

BEN STEELE MIDDLE SCHOOL SITE ACQUISITION PROCESS

Situated on the western edge of the patchwork that is the Billings city limits, Ben Steele Middle School is the new flagship facility of Billings School District #2. When, in 2012, the district faced state censure and threats to its accreditation due to over-crowding in its elementary schools, the school board commissioned a demographic study and subsequent facilities assessment and masterplan from O2 Architects and DLR Group to determine how best to address their capacity and accreditation crisis. Public input during this process indicated strong community preference that, if new facilities were to be built, any Elementary school be no larger than 350 students, and Middle schools be no larger than 750 students. Questionnaires and surveys also indicated that athletic fields as part of any Middle school facility were of import to the community (Greenbe, & Olsen, 2013).

The 2013 Facilities Master Plan recommended that the district undertake a two-phased solution to their over-crowding crisis. The first phase contained four key elements; a re-configuration of grade levels, moving sixth graders from elementary to middle school facilities, the construction of two new middle schools, renovations at two of the district's oldest elementary schools, and funding for deferred maintenance district wide. Phase two of this plan included a new elementary school and capacity additions at several existing schools subject to subsequent demographic analysis.

When the decision to construct two new middle schools was reached, the school district assembled a siting committee tasked with selecting parcels where the new facilities

would be built. Key factors included adjacency to existing residential areas, safe routes to school (SRTS), and infrastructural and development costs.

In interviews with two of the members who sat on that committee; former School District #2 facilities director and bond manager, Lewis Anderson, and City of Billings engineer, Chris Hertz, both confirmed that the district no longer uses set minimum acreage standards for its new facilities. However, their accounts of the committee's decision-making process clearly indicated that all other considerations were essentially subordinate to the new facility's perceived acreage demands. Although organizations promulgating guidance on best practices for school development like the Collaborative for High Performance Schools (CHPS) and the Association for Learning Environments (formerly the CEFPI), have similarly abandoned their minimum acreage standards, high de-facto acreage standards have lingered on at School District #2.

"We like to have fifteen to twenty acres for a middle school. We know that's what it takes. . . the recommendation of the architect that we had at the time told us that was a good acreage to have for a site."

Lewis Anderson, January 20, 2020

. . . The way that they did it was they went out and looked at a bunch of different vacant properties that were big enough for a school. And they gave us the properties to look at . . . and we voted on 'em.

Chris Hertz, January 14, 2020

The district's demographic study had recommended that these new facilities be located within one mile of existing facilities, Will James Middle School in the west and

Castle Rock Middle School in the northern area of Billings, colloquially known as “The Heights” (Figure 3.05).

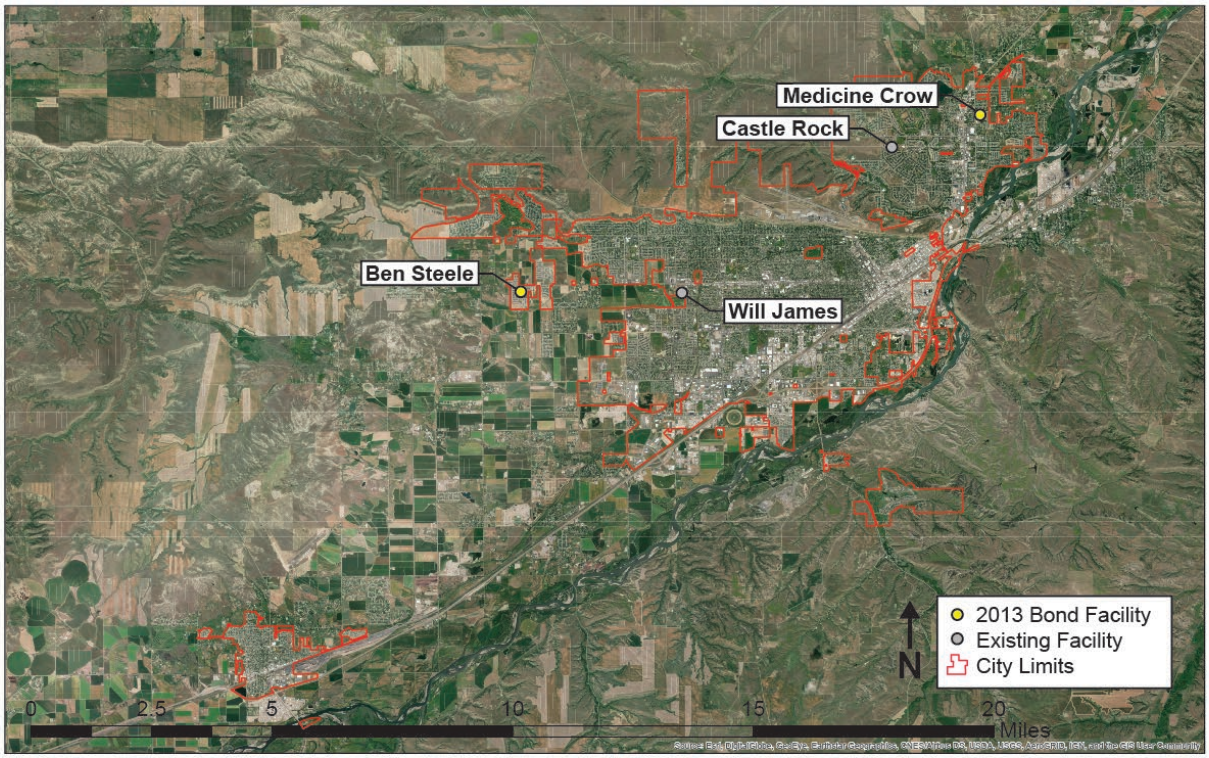


Figure 3.05: Relative School Facility Locations

It was, however determined that the new middle school in the heights would be placed on a thirty-acre parcel two miles to the east of Castle Rock, to serve neighborhoods on that side of the pedestrian barrier of the seven-lane, Highway 87/ Main street.

The site has the benefit of adjoining the Kiwanis multi-use trail and the existing Bitterroot Elementary, allowing for shared use of the facility’s new athletic fields. (Figure 6).

Figure 3.06: Medicine Crow and Castle Rock Middle Schools

On the West End, the demographic study also recommended that the new school be within one mile of an existing facility, Will James Middle School. In this instance, the siting committee explored the option of purchasing parcels within that recommended distance, but ultimately voted to locate the new middle school on the thirty-five acre parcel the district had purchased in 2000, more than three miles west of Will James, on the edge of the city's suburban development (Figure 3.07).

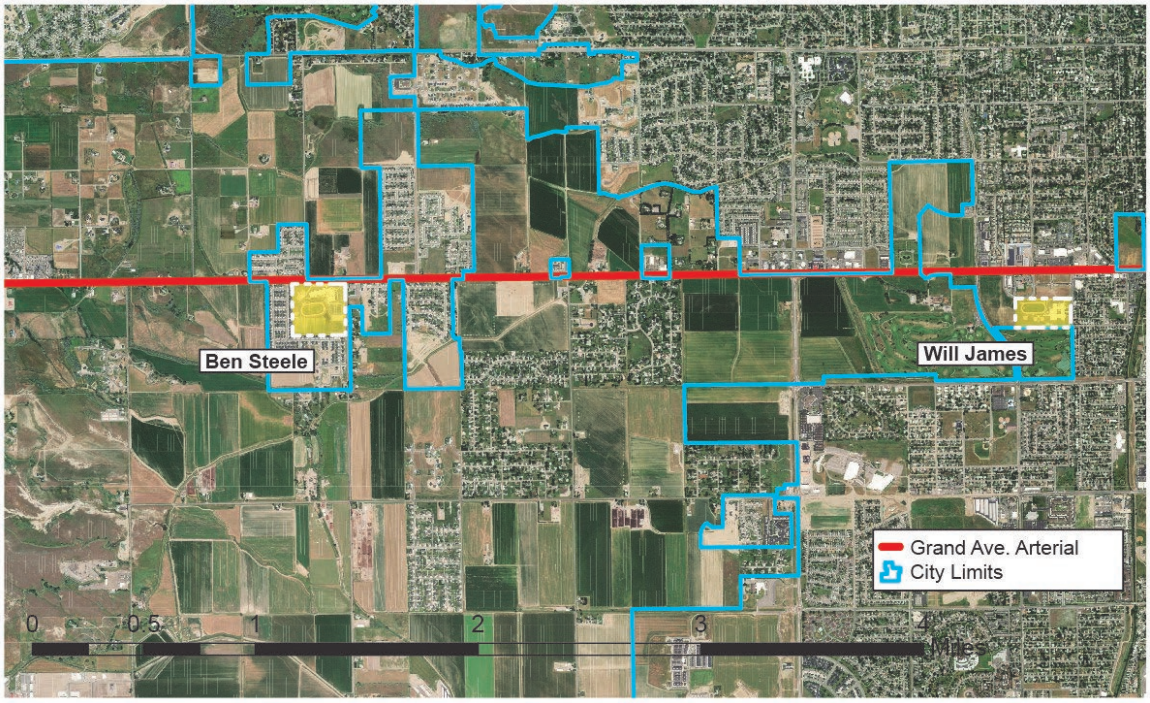


Figure 3.07: Will James and Ben Steele Middle Schools

Again, the perception that a middle school could not be sited on less than thirty to forty acres was fundamental to the committee's decision-making process.

We thought "we find something a little bit closer, we'd sell our piece and buy something," but there just wasn't a forty-acre piece out there.

Lewis Anderson, January 20, 2020

When the board selected its site at Grand and 56th street west, key considerations included the existence of a water and sewer line that the city had put in along Grand Avenue in 2004 in response to growth in that area.

If we wouldn't have ran water and sewer out here in 2004, Ben Steele wouldn't be here right now. It would be somewhere else. It would be way closer to the city. Way closer. I don't know where, but it would be way closer.

Chris Hertz, January 14, 2020

. . . when the city built the water and sewer lines all the way out to Iron Wood, the horse is out of the barn if you know what I mean.

Lewis Anderson, January 20, 2020

In the case of Medicine Crow Middle School, the new facility in the Heights, the school district had learned the costly lesson of selecting a site where water and sewer services did not exist. In addition to the cost of pipelines, the majority of the Heights, including the new Medicine Crow, is also within a special water district where citizens have the privilege of buying water at a mark-up from a third party that, in turn, purchases water from the city of Billings (Figure 3.08).

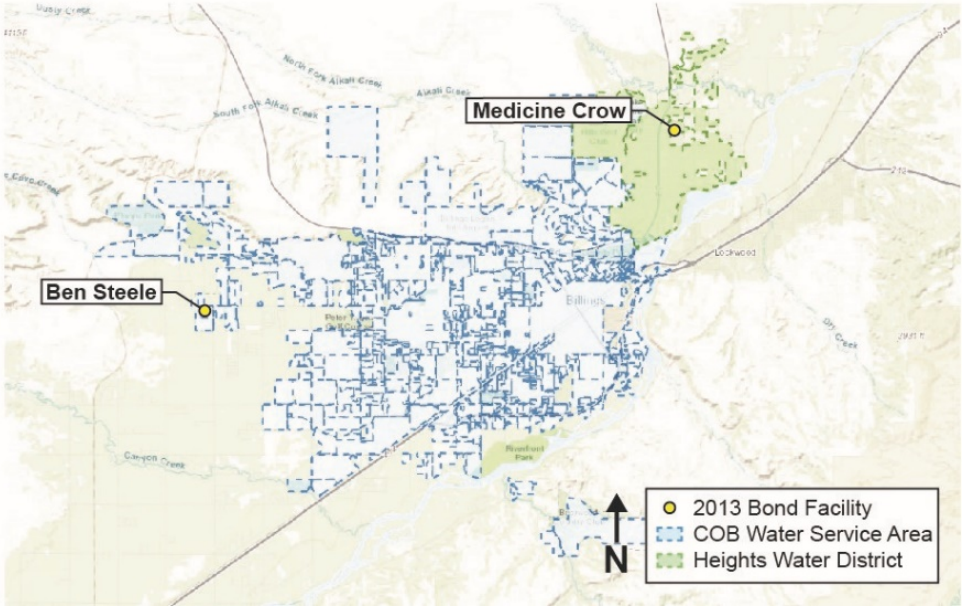


Figure 3.08: New Facility Water Service

BEN STEELE SITE DESIGN

Once the siting committees had recommended sites to the school board and the school board had approved those sites, School District 2 placed a bond on the fall 2013 ballot to request funding from its voters. That bond, which included 36 million in deferred maintenance across the district's twenty-six other elementary and middle schools, as well as 25 million in renovations targeted specifically at two of the district's oldest elementary schools, provided nearly sixty million dollars for two new middle schools, which would become Medicine Crow and Ben Steele Middle Schools. At the time of the bond's consideration by the school board, concerns were raised as to the ability of the district to fund such a new facility's ongoing operations and staffing, and one school board member resigned in protest to the board's decision to move forward with the bond (Rogers, 2013).

After the bond passed, site design and planning began. Ben Steele's thirty-seven-acre site had always been intended for both a middle and elementary school, but when that

elementary school will be built is still uncertain. Demographics predict a leveling or decline of elementary-aged children in Billings. As it stands, Ben Steele Middle School is the biggest school, by acreage, of any of District #2's facilities. Architect Dusty Eaton, of A&E Architects, who designed both Ben Steele and Medicine Crow, acknowledged that the school has more acreage than it may need.

. . . they (Ben Steele and Medicine Crow) are bigger than a recommended site but let's use that to be a community amenity.

Dusty Eaton, January 13, 2020

The "community amenity" Mr. Eaton is referring to is its ample athletic fields. As is often the case around the nation, (Beaumont and Pianca, 2002) community demand that public school districts provide ever more athletic fields on site is the primary programmatic driver of large school sites, the cause of which will be explored in chapter five.

The last five schools we've designed, each time there's a community org that comes forward to say "let's not miss this opportunity to get some dual use here.

Dusty Eaton, January 13, 2020

Ben Steele's site includes two baseball fields, a football field and track with bleachers, and three regulation soccer fields, making it functionally a regional park as well as a middle school. Analysis breaking each site into four use categories; building footprint, vehicular parking and circulation, landscape, and athletic fields begins to reveal the cause of increased acreage demand in school sites. The "landscape" category, which has nearly

quadrupled in area from Lewis and Clark in 1956 to Ben Steele in 2027, includes all exterior acreage, both paved and unpaved, which is not vehicular or within the bounds of an athletic field. This category therefor includes everything from on-site stormwater detention and retention, to paved courtyards to grassy areas between athletic fields where children and families might watch games on those fields. It is therefore reasonable to assume that some of the area attributed to the "landscape" category is actually attributable to the athletic fields, but for the sake of methodological consistency, those areas were not included in the "athletic field" category.

Athletic field acreage has increased two-fold from the District's oldest middle school to its newest, and although, at first glance, it is overshadowed by greater growth in landscape acreage, increases in athletic field acreage require greater areas of site drainage, parking, and landscape, thus driving the bloated acreage of school sites. (Figure 3.09)

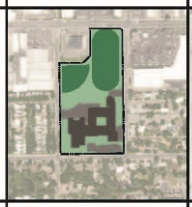
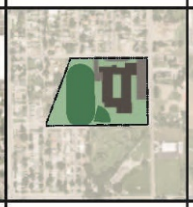
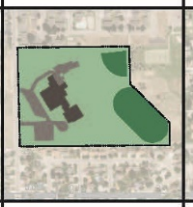
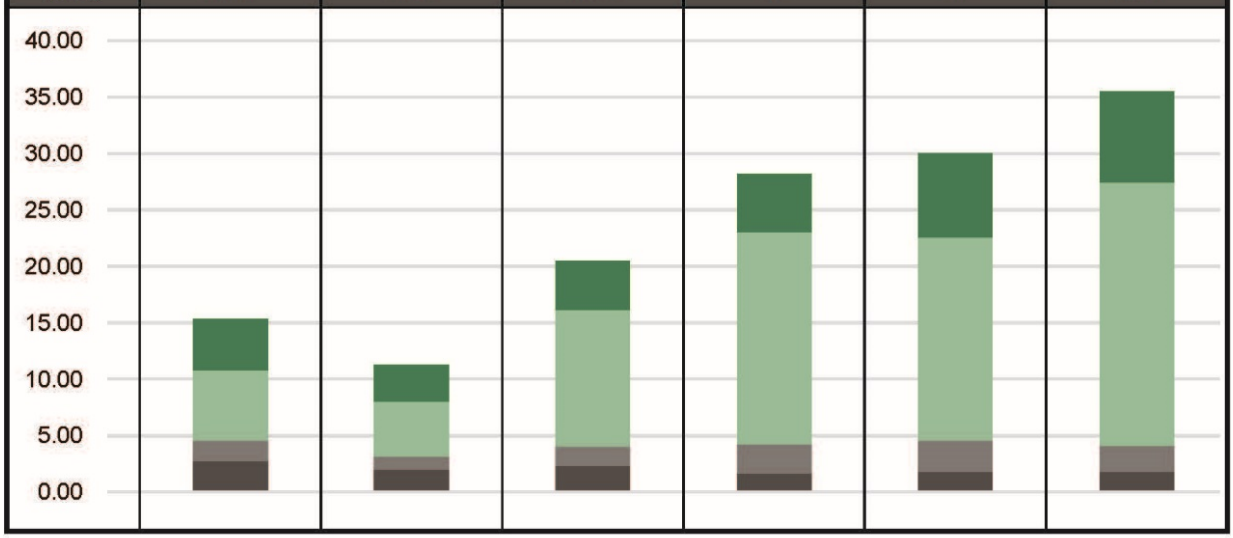
School	Lewis and Clark	Riverside	Will James	Castle Rock	Medicine Crow	Ben Steele
						
Year Built	1956	1963	1967	1977	2016	2017
Target Capacity	687	559	614	661	661	661
Site Area (Acres)	15.35	11.29	20.44	28.18	30	35.5
Athletic Fields (Acres)	4.56 29.7%	3.24 28.7%	4.31 21.1%	5.14 18.2%	7.46 24.9%	8.06 22.7%
Landscape (Acres)	6.17 40.2%	4.86 43%	12.07 59%	18.82 66.8%	17.96 59.9%	23.33 65.7%
Vehicle Pkg/ Circ. (Acres)	1.88 12.3%	1.16 10.3%	1.70 8.3%	2.53 9%	2.79 9.3%	2.28 6.4%
Building Footprint (Acres)	2.73 17.8%	2.03 17.9%	2.36 11.6%	1.69 6%	1.79 6%	1.83 5.2%
						

Figure 3.09: Middle school site analysis

The grounds of Ben Steele Middle School abut two arterial streets, Grand Avenue and Fifty-sixth streets on its north and east edges respectively. A&E Architects placed the school building itself in the north-eastern corner of the site, intending that it would have a greater presence on those roads, balancing an bolstered sense of civic pride in a public building with the need to provide a safe environment for children.

. . . these are streets out here with no sidewalks, fifty miles an hour, and this is a heavily-used street for all these neighborhoods coming to town in the morning and back out in the evening. It's a dangerous road, quite frankly. That was the biggest fear from the district, from everybody in this site is, we have to be extremely careful with how students get here, with how they get dropped off, that we're keeping the play areas tucked further into the site.

Dusty Eaton, January 13, 2020

Accordingly, the site is designed from the arterials, toward the site interior, setting the building back from the Grand Avenue right of way by approximately 140 feet and from fifty-sixth by about 190 feet to provide adequate space for vehicular drop-off and parking, and to buffer the students from the threat of high-speed, arterial traffic. The building is angled slightly from the street's cardinal axes to provide a rear courtyard protected from prevailing winds. The building itself is divided into communal and academic wings, allowing the academic wing to be secured and programmatic elements such as the library, cafeteria and gym to be used by the greater community during off-hours (Figure 3.10).

The rear yards of the adjacent "Trails West" subdivision abut the southern and western property lines of the Ben Steele site. About 2,400 linear feet of vinyl fence is broken in two places where the developer dedicated two pedestrian trail connections to the site in anticipation of the school's construction.

Figure 3.10: Ben Steele Site Design

BEN STEELE SAFE ROUTES TO SCHOOL IMPROVEMENTS

In terms of site access, one of the Ben Steele's greatest weaknesses was its almost complete lack of pedestrian facilities on the roads that students were most likely to take to school. All roads leading to the school site were two-lane, fifty mile-an-hour arterials. A multi-jurisdictional coordination process that included the city and the school district sought to provide those facilities which might create a safe route to school for students living in the area. The county was not involved in this process because, "The county doesn't

build roads. They maintain roads. They don't build capacity. They just maintain it" (Chris Hertz, January 14, 2020).

Although standard arterial street sections include five traffic lanes and pedestrian facilities within a ninety-four-foot right of way, limitations to funding and ROW acquisition lead the process toward a narrower street section solution (Figures 9 and 10).

Figure 3.11: Standard Arterial Section, City of Billings

Figure 3.12: Post-Improvement Street Sections, City of Billings

Improvements to Grande Avenue, 54th and 56th Streets required relocation of private utilities and right-of-way dedications to make room for a center turn lane and pedestrian facilities. A combined 61,000 linear feet of sidewalk and multi-use path were constructed on segments of these streets. Additionally, a HAWK beacon and crosswalk were installed on Grand Avenue at Ben Steele's main entrance. Crosswalks were also installed on the northern segment of 54th Street near the Mont Vista subdivision and at the intersection of 54th Street and Grand Avenue with a new traffic signal (Figure 3.13). In the interest of child safety, speed limits on the roads which the school fronted were reduced, but because of statute limiting the overall percentage reduction (which was recently repealed) the current speed limit in front of the school is 35MPH rather than the 25 to 15 MPH in most Billings school zones.

Figure 3.13: Right of Way Improvements, City of Billings

A development agreement in conjunction with the school parcel's annexation was met between the city and the school district enumerates the infrastructural improvements to these rights of way and the parties responsible for what portions of said improvements. School District 2 paid for, among other improvements, the HAWK signal on Grand Avenue, certain segments of sidewalk and mixed-use path (for which it is eligible for future reimbursement), and a small percentage of future intersection improvements near the site averaging 4.4% of those costs.

Funding for all area improvements came from the City of Billings, School District #2 and private developers' traffic impact fees. Of the budgeted four-million-dollar cost of these improvements, the city paid the greatest share, 2.2 million dollars, development fees covered one million, and the district paid 800 thousand dollars. The city's contribution

necessarily came from its Capital Improvements Plan (CIP) and budget, which had not anticipated improvements in this area for another ten or more years, requiring a substantial re-allocation of funds. (Figure 3.14)

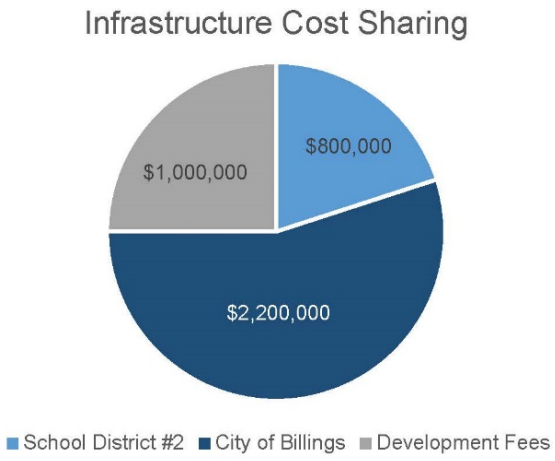


Figure 3.14: Infrastructure cost sharing

SUBURBAN DEVELOPMENT SURROUNDING BEN STEELE

When the siting committee chose the parcel where Ben Steele was built, they considered its proximity to residential households which generate student populations, development costs, and safe routes to school. This section will analyze the suburban development in the 1.5-mile radius area surrounding the school through the lens of two indicators, the likely number of students who will have a reasonable chance of walking to school, and the development's value per acre. The rationale for using these indicators will be explained in more depth in chapter three.

The state of Montana uses a three-mile "walk zone" to determine which students receive free busing and which must pay to get a ride to school. If a student's home is further than three miles from their school, by network distance (car, bicycle, walk) they ride the

bus for free. “Free outside of three” is the slogan that Elder Grove District #8 Superintendent, Nathan Schmitz uses. Students within that distance can walk to school if they wish, according to the state, and therefore must pay, usually $260-$140 annually per student. Of the 9,260 residential addresses in the Ben Steel school boundary, 4,224 or 46% are within a three-mile network distance of the school. This calculates to roughly 340 students who are likely within Ben Steele’s walk zone.

Using this ratio, the “walk zone ratio” we can analyze the connectivity of the street and pedestrian grid and its ability to provide children the ability to walk to school, which also provides a school district with students it does not have pay to bus to school. The “walk zone ratio” is the percentage of residential addresses within a certain direct, or Euclidean distance, that are also within the same network distance, say three miles, from the same center point. For example, Ben Steele has 6,898 residential addresses within a three-mile-radius circle around it. Of those, 4,224 are within a walk of three miles or less to the school, so Ben Steele has a three-mile walk zone ratio of 0.61. (Figure 3.15)

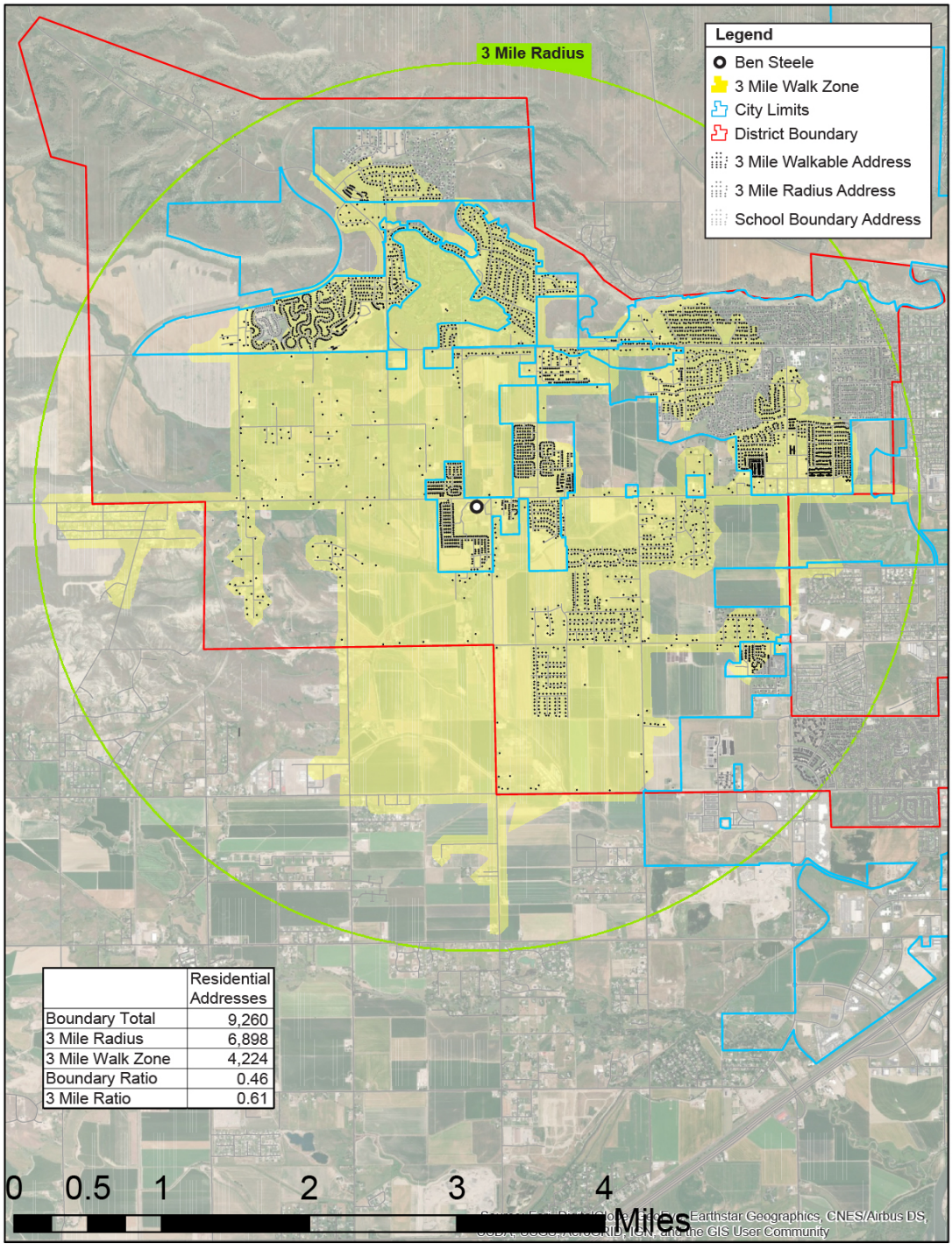


Figure 3.15: Ben Steele three-mile walk zone

The problem with using the three-mile, state-mandated walk zone is that it is not a good indicator of a child's real-world ability to walk to school. While Montanan's may be tough, they are not foolish. As I will discuss in the following chapter, the greatest danger that children face in moving about the city is that posed by cars. It is not reasonable to expect a child aged 11-14 to walk three miles, a distance that an adult can cover in 45 minutes, given Montana's unpredictable weather, and sporadic provision of safe routes to school in developing areas. The financial implications of this disconnect between state policy and reality will be explored in later chapters.

Canada, a nation with similar climate and geographic population dispersal to that of Montana, uses a 1.5-mile walk zone, outside of which bus service is free (Vitale et all 2019). This network distance is much more feasible for a child to walk and offers a framework for prioritizing infrastructure investments that will be explored in chapter seven. Through the lens of the 1.5-mile walk zone, a much more realistic accounting of which students have a reasonable option to walk to school can be reached. Of the 1,682 residential addresses within 1.5 miles of Ben Steele, 953 are within 1.5 miles on foot. Thus the 1.5-mile radius area around Ben Steele has a walk zone ratio of 0.57. When a 1.5-mile walk zone is applied to the Ben Steele school boundary, only 10% of households have a reasonable option to walk to school (Figure 3.16).

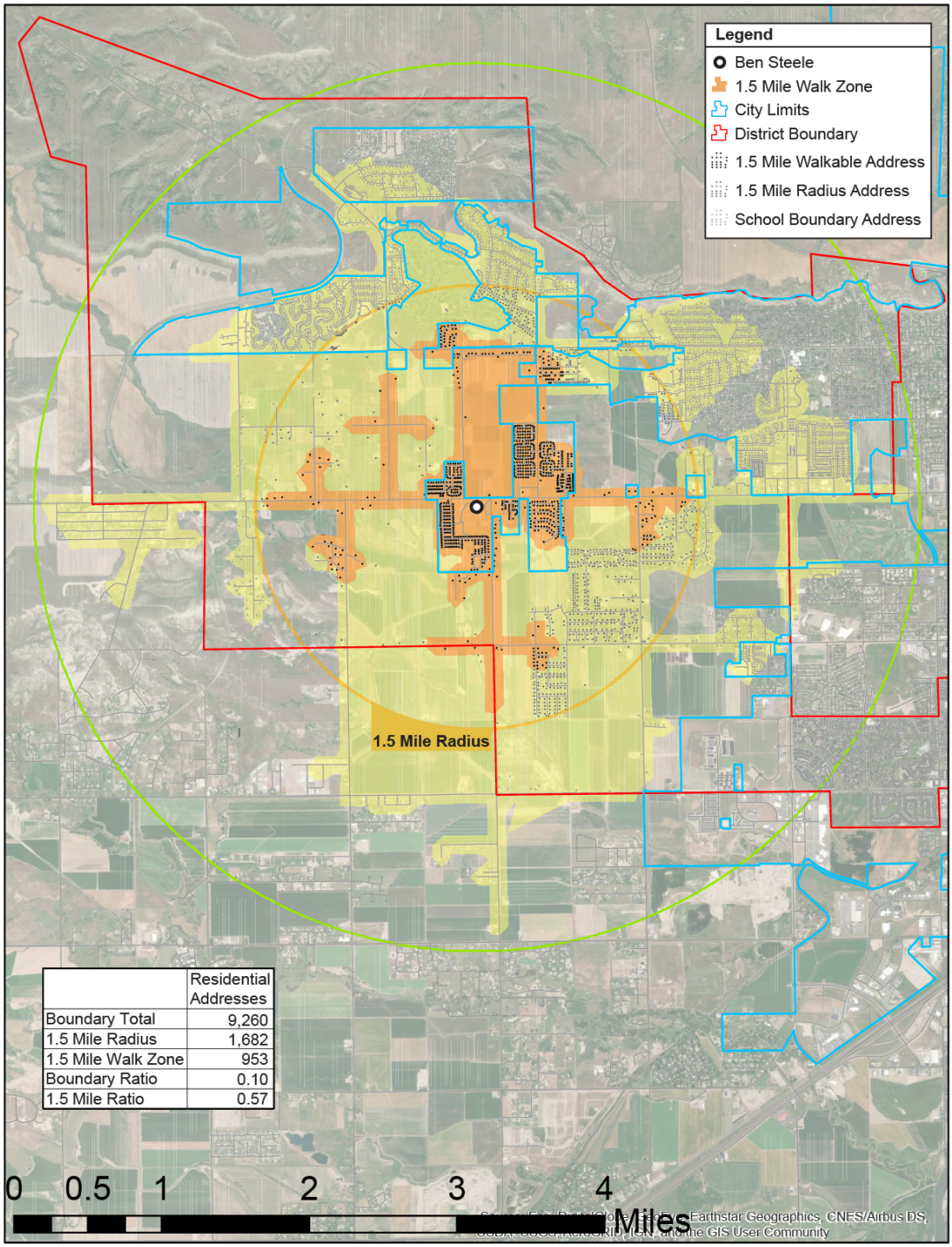


Figure 3.16: Ben Steele 1.5-mile walk zone

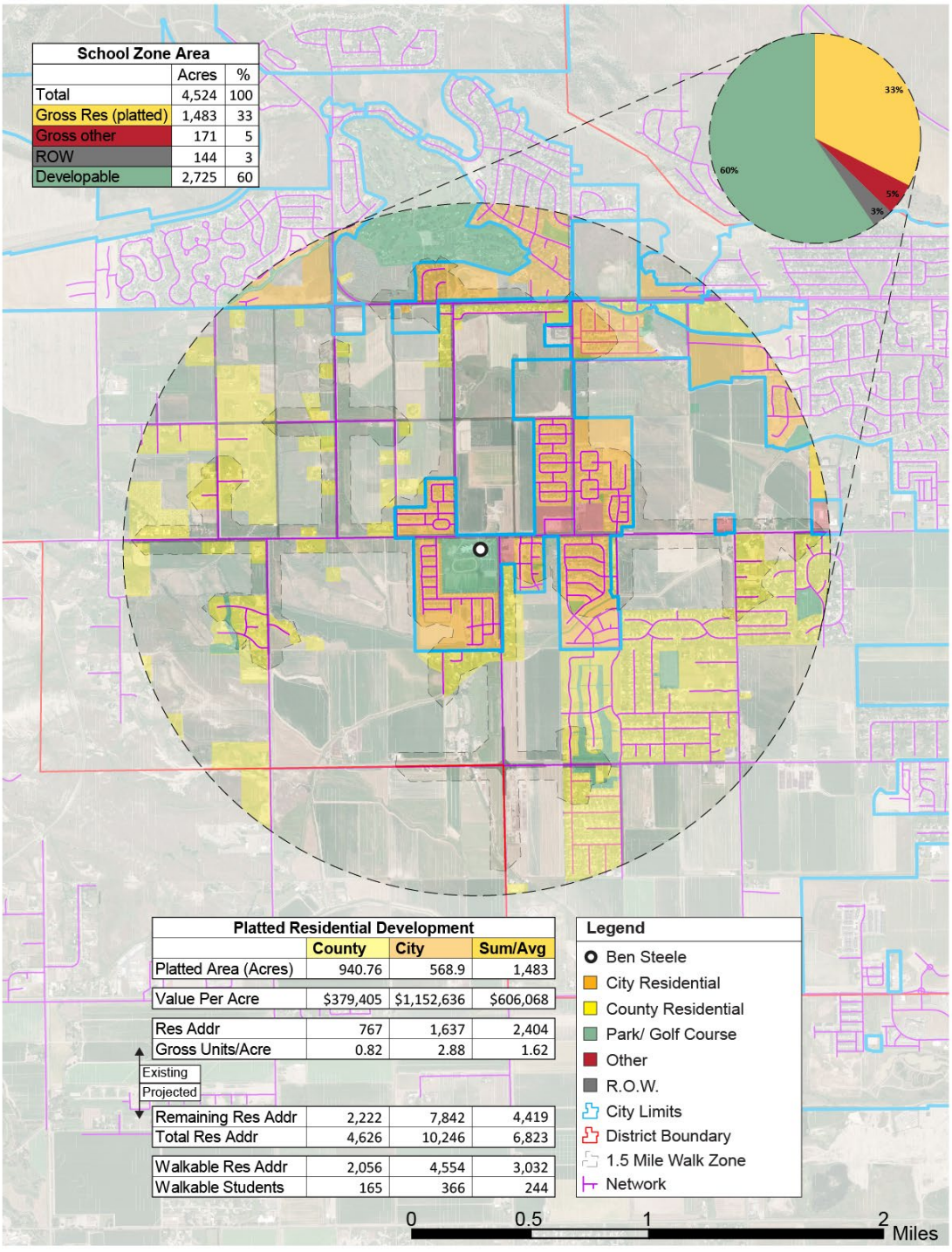


Figure 3.17: Ben Steele 1.5-mile development analysis

Chapter 4: A Rural District in the Path of Growth: Elder Grove Middle School and its Environs

Bordering School District #2 to the west, is the largest independent school district, by land area, in the state of Montana, Elder Grove Elementary District #8 (Figure 13). The historic Elder Grove school house was built in 1904 on farmland donated to the district by the O'Donnell family, who still live in the area today. The district later purchased the five-acre parcel on which the schoolhouse still stands for one dollar, for tax reasons. Since then, this largely rural district experienced moderate population growth until recent years brought a student population spike. From 2000 to 2016, Elder Grove School District increased from 313 students to 526, making it the second-fasted growing district in the county, behind only Elysian (Figure 14). As of January 2020, Elder Grove's enrollment stood at 616 students, just under double what it was in 2000.

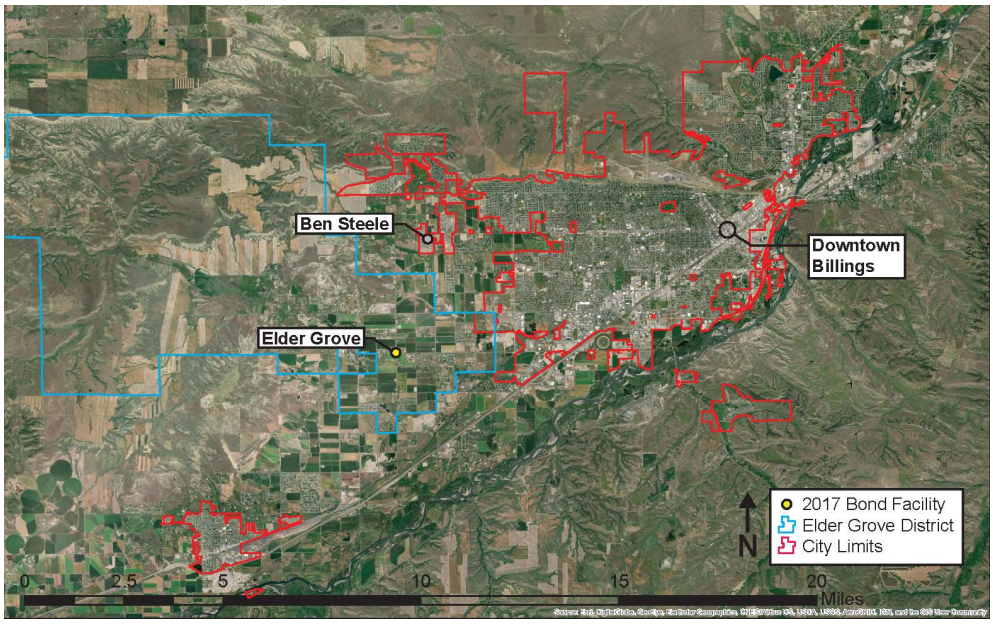


Figure 4.01: Relative location of school facilities, Elder Grove middle school

School District	2000 Enrollment	2016 Enrollment	Enrollment Change 2000-2016	Rate of Change 2000-2016
Elder Grove	**314**	**536**	**222**	**70.7%**
Elysian	131	285	154	117.5%
Blue Creek	159	201	42	26.4%
Laurel	1,219	1,468	249	20.4%
Billings	10,392	11,344	952	9.2%
Lockwood	1,244	1,146	-98	-7.9%
Canyon Creek	250	231	-19	-7.6%

Figure 4.02: Local Area K-8 Enrollments, K-12 Consultants (Eisen, 2016).

This growth has driven the district through a series of overcrowding crises and incremental facilities expansions on their campus, including a five-million-dollar, bonded expansion in 2012 (Hoffman, 2017). By the fall of 2017, conditions at the school had become untenable according to district Superintendent Schmitz.

. . . we've got this closet over here that we turned into an office, a couple other closets we've literally turned into small break out spaces for students. We had breakout spaces in the hallway. Our primary music teacher is teaching out of the concession stand. . . when you get to that point you can say "where would I go next? If I have to add a fourth third grade (class) next year, I don't have a classroom

We have a larger classroom, a 1200 square-foot classroom in the original schoolhouse. We put a wall up in between it and made two 600 square-foot classrooms, reduced the roster on those two teachers and said, "sorry, you've got a smaller space". . . You can only subdivide so many times before you start to effect the academic ability to achieve.

We're running 600 students through one cafeteria in 70 minutes. Our lunch period for any given grade, they get 15 minutes to eat, and they're gone. Not sufficient. 15 minutes for recess, and they've gotta get back inside because we have to cycle the playground because we don't want too young of kids with too old of kids because we end up with behavioral problems. . . on both fronts, not long enough. Kids need more time.

Nathan Schmitz, January 3, 2020

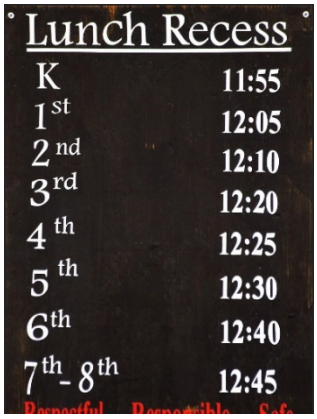


Figure 4.03: Elder Grove Lunch Schedule, Billings Gazette

To convince constituents and school board members to place a bond on the ballot in 2017, Schmitz had to demonstrate that the school was in dire need of expansion. He placed a GoPro camera in their cafeteria during its lunch period, sped up the footage, set it to *Flight of the Bumble Bee*, and posted it on the school's Facebook page. In December of 2017 voters approved a $14.9 million bond to build a new middle school.

Where the 2012 bond had enabled the school to expand facilities at its existing campus and purchase a 5-acre parcel immediately to the north, finding a site big enough for a middle school required the district to purchase a parcel to the east across 64th Street

West, a two-lane, county road designated to become a principal arterial, as is Hesper Road, to its south. The new Elder Grove middle school has a capacity of 325 students, can expand to accommodate 500, and is anticipated to open near capacity in the fall of 2020.

Figure 4.04: Elder Grove School campus. Original site on left. New middle school facility at right.

After extensive deliberation, and against the wishes of many community members, the district elected to build a 2-story structure in order to avoid consuming too much of the site with the building footprint. The building's program is similar, in principle, to Ben Steele: a securable academic wing allows for communal access to gym, library, and commons spaces during off hours. Outdoor athletic facilities include an overlapping soccer and football field circumscribed by a track. (Figure 4.04)

Because the new middle school is in the county, and not the city, the scope of construction and on-and-off-site improvements did not include any new sidewalks on the roads fronting or bisecting the campus. This is result of two, overlapping, cash-strapped

local jurisdictions, neither of whom see their role as providing increased pedestrian safety or facilities, even if those pedestrians are children.

Until they expand to 3 lanes, we run the risk of. . . in order to put it [sidewalks] in we would have to go so far off the road, which wouldn't necessarily be a problem as long as we routed it to the intersection, but knowing that that would be a county responsibility ultimately, if and when they expand the road, it would be a cost we would be taking on unnecessarily. The county would love for us to take it on, don't get me wrong, but that, just like in the city, is ultimately their responsibility, we don't want to encourage any [pedestrian] traffic along the western side of our new site because we fear that people will try to cross at uncontrolled places. So we're actually fencing the west side of the property with the exception of the intersection.

Nathan Schmitz, January 3, 2020

A signalized crosswalk at the intersection of Hesper and 64th Street connects the two sites. Both a skybridge and an underpass were considered but deemed to be cost prohibitive. Here, pedestrian safety is at counter purpose with the need to alleviate vehicular congestion for through traffic, parents, and busses.

The rural ideal of a neighborhood school and park one's children can walk to requires sidewalks or trails to those facilities. In the hypothetical event that all roads and arterials in the Elder Grove district were built to include pedestrian facilities, the percentage of students in the district who could walk to school would be severely limited by the low density of its surrounding development.

Of the 2,068 residential addresses in the Elder Grove District, 1,552 are within three miles of the school. Of those, 819 are within a three-mile network distance,

irrespective of sidewalks. Thus, the school has a three-mile Walk Zone Ratio of 0.53, which is actually better than Ben Steele (Figure 4.05).

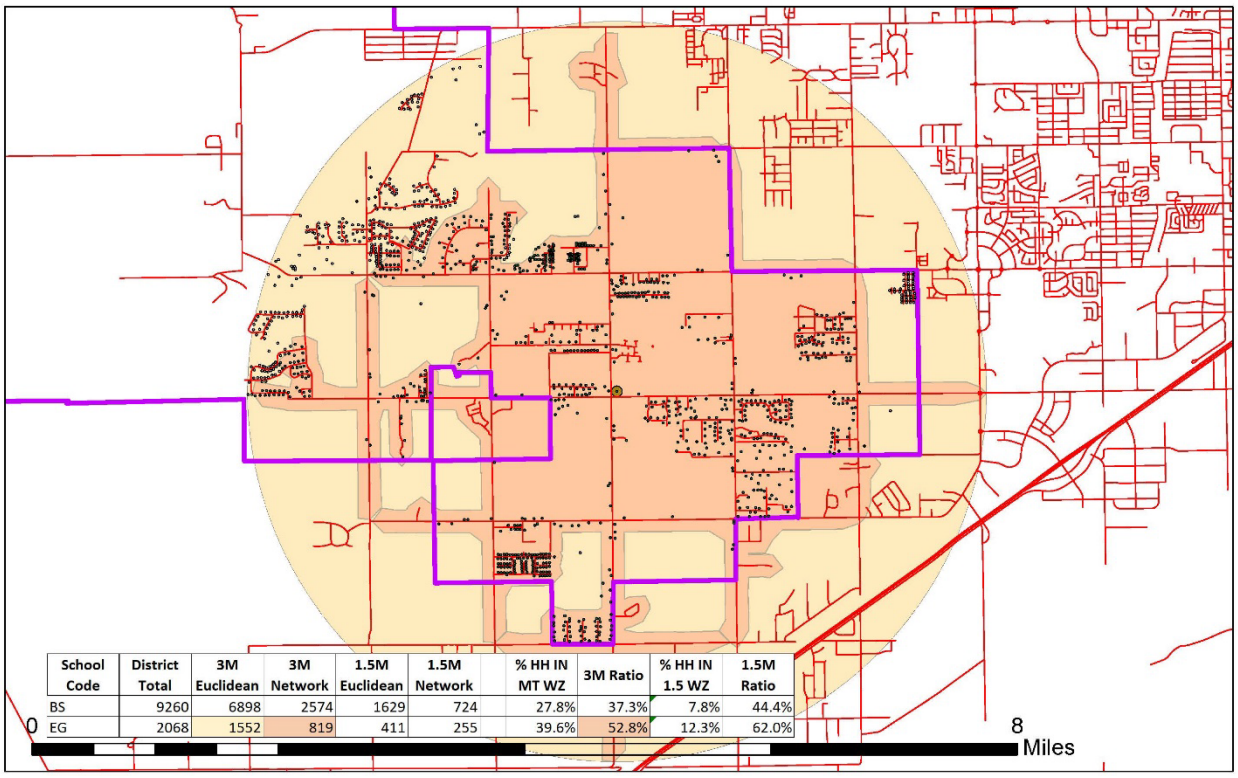


Figure 4.05: Elder Grove 3-mile walk zone within a 3-mile radius with Ben Steele data for comparison

But, as discussed in earlier chapters, the three-mile walk zone is not actually representative of a child's ability to walk to school. There are 411 residential addresses within 1.5 miles of Elder Grove. Of those, 255 are within 1.5 miles by street network. Thus, the school has a Walk Zone Ratio of 0.62 (Figure 4.06). Compared to Ben Steele, it may appear that Elder Grove is a more walkable school district, but this is probably a product of the scarcity of development in outlying areas of the district. At all rates, without pedestrian facilities, the likelihood that children within 1.5 miles, by network, of the school are unlikely to engage in active school commuting.

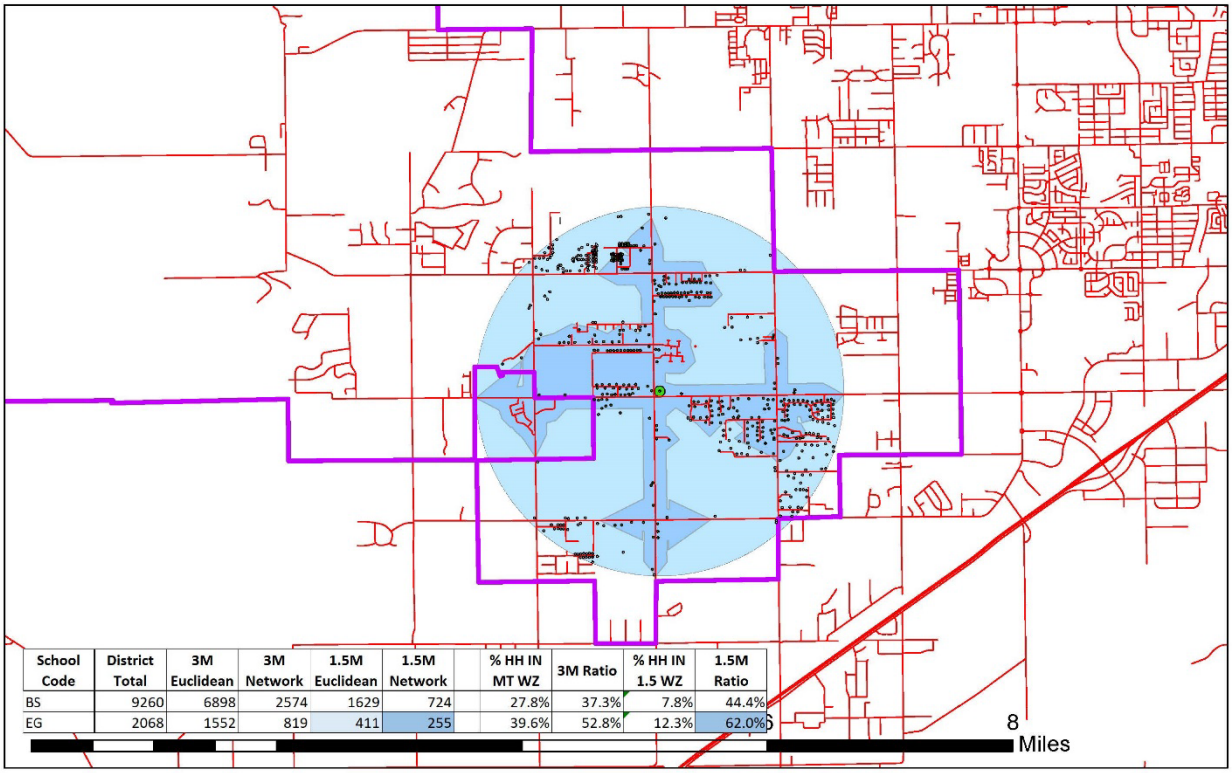


Figure 4.06: Elder Grove 1.5-mile walk zone within a 1.5-mile radius with Ben Steele data for comparison

Chapter 5: Consequences of the Status Quo

Why does any of this matter? So what if our schools use more land than they need? What does it matter that a dwindling number of our children have the choice to walk to school? The consequences of continued status quo school and suburban development will, over the next 20 to 50 years, reap nothing less than the squandering of Montana's natural heritage, the insolvency of local jurisdictions, and the loss of immeasurable human capital.

Historical Foundations of Suburban Land Use and Development

Someone much smarter than I once said, "Men make their own history, but they do not make it as they please; they do not make it under self-selected circumstances, but under circumstances existing already, given and transmitted from the past."

With this in mind, we can understand why each player in the city-building game; private developers, city and county governments, school districts, and private citizens; each with their own constraints and goals, makes rational, if myopic, decisions that combine to make the suburban landscapes that many of us inhabit today.

The social problem of creating cities that are nurturing of families and children is older than the planning profession itself. Different cultures address this challenge by various means. The earliest examples of the American attempt at a solution, suburbia, date from just after the American Civil War, when rail began to enable middle and upper-class families to escape the ills of the city. The purpose of these early suburbs was, ". . . about giving one's children the space they needed yet controlling the people they met and what they did outside the home" (Lange, 2018). Because these developments relied on pedestrian access to a rail station, they were much denser than the automobile-dependent suburbs of today (Duany et all, 2010).

The expansion of rail heralded the entrance of the Industrial Revolution, which irrevocably disrupted the status quo, historical, method of slow-growth city-building (Marohn, 2020). Industry created the need to separate noxious, polluting land uses from residential areas for the sake of public health. Eventually, "modernists" like Le Corbusier sought to use the disruptive ethos of the industrial age to redesign the city, and to solve the age-old problem of urban domesticity. For the modernists, no problem was too complex to be understood through the metaphor of the machine. Homes became "machines for living." The street was no longer a place that supported social and civic life, but an engineering problem to be solved for maximize vehicular through-put. Neighborhoods became "zones." The modernist movement applied industrial efficiency to sort the complex, mixed city into simple, separated districts. This sorting also created the need to traverse great distances between zones in the city. To this problem the Modernists proffered a predictably mechanical solution, mass ownership of automobiles.

The modernist vision of the separated city spread through academia, local governments, and state zoning enabling legislation. By the end of World War Two, Modernist ideas had reached the federal government. And so was born the suburb as we now know it. Andres Duany, founder of the Congress for New Urbanism, (CNU) explains:

Far from being an inevitable evolution or a historical accident, suburban sprawl is the direct result of a number of policies that conspired powerfully to encourage urban dispersal. The most significant of these were the Federal Housing Administration and Veterans Administration loan programs which, in the years following the Second World War, provided mortgages for over eleven million new homes. These mortgages, which typically cost less per month than paying rent, were directed at new single-family suburban construction. Intentionally or not, the FHA and VA programs discouraged the renovation

of existing housing stock, while turning their back on the construction of row houses, mixed-use buildings, and other urban housing types. Simultaneously, a 41,000-mile interstate highway program, coupled with federal and local subsidies for road improvement and the neglect of mass transit, helped make automotive commuting affordable and convenient for the average citizen.

(Duany et all, 2010)

The availability of cheap, suburban homes and subsidized vehicular transportation lead many Americans to move from the city to the suburbs. This, in turn, prompted many cities to effectively hollow out their downtowns and eviscerate well-established urban environments to make room for parking and expanded roadways. This cycle continues today, as street sections and lanes continue to widen and high-speed arterials, more akin to highways than city streets, bisect our neighborhoods (Speck, 2012).

This car-centric city ideal has created an environment in which many feel unsafe walking or bicycling, and with good reason. In 2017, over 37,000 Americans were killed, and another 2.7 million injured, in traffic crashes (NHTSA, 2019). Our nation's traffic fatality rates are twice those of any comparable, developed nation (CDC, 2016). Montana is no different. In 2017 Montana was the 7th most deadly state in the union by fatalities per vehicle mile traveled, or VMT (NHTSA, 2019).

As early as 1910, when automobile use was becoming widely used in city streets, the leading cause of death for children ages five to fourteen was traffic crashes (Lange, 2018). Before the advent of the automobile, streets were the domain of children, but mounting traffic deaths prompted the American Playgrounds Movement to advocate for separate, safe space, in which children, and play, could be contained (Lange, 2018). In this

way, children were the first to be displaced from the street, eventually followed by any adult not behind the wheel of a car (Duany, 2010).

WHY SCHOOL SITES ARE SO BIG

Given this annual carnage in our streets, it's easy to understand why parents don't allow their children to range freely in their neighborhoods as they did just a few generations ago. A study of four generations of one family in England found that, as children, the free-range distance each could travel autonomously has shrunk from six miles in 1919 to only 300 yards in 2007 (Figure 5.01).

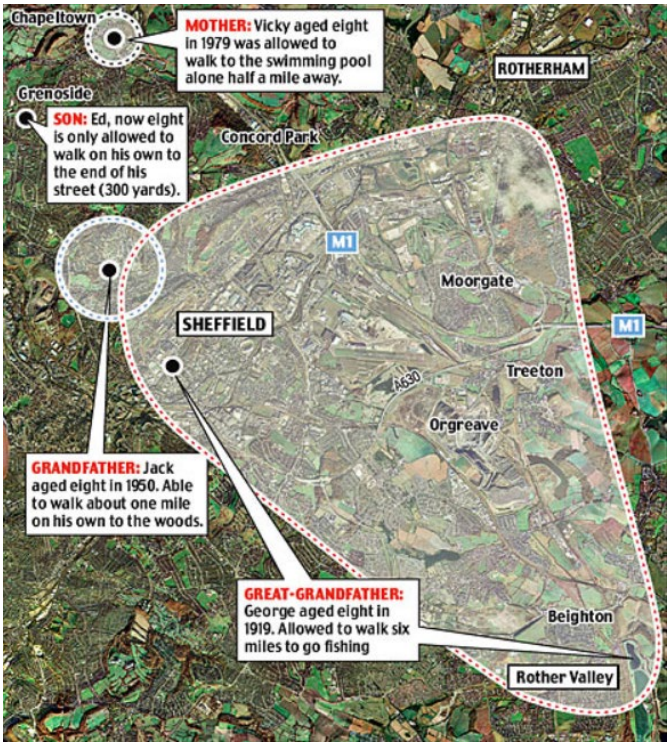


Figure 5.01: Free-range distance of children across four generations (Daily Mail)

Although the modern suburbs created private homes with yards in which to safely raise children, they have cumulatively created cities that are far too dangerous for those same children to safely navigate on their own.

In separating family life from city life, from work, from shopping, from institutions, the suburb created a land of perpetual childhood.

The green space was a blessing, for a time, but when children reached the age to explore, mentally and physically, there was nothing more within reach. The image of the suburb as a nursery, a clean, soft, bounded space for those of limited ability is a compelling one: The nursery is fine for a while, but then you need to learn how to walk.

Lange, 2018

Such a segregated community, composed of segregated economic strata, with little visible daily contact with the realities of the workaday world, placed an undue burden of education on the school and family.

Mumford, 1981

Cities that disallow children the independence to go about their daily movements to school, home, and play, require not only that parents drive them to those places, but also creates the ". . . expectation that mothers will supervise their children at all times, or pay someone else for the privilege" (Lange, 2018). I an economy where the single-income household is increasingly a thing of the past, the burden on ". . . the mother, and the family income, to provide 24/7 coverage," is even more acute (Lange, 2018).

In this construction of the city, "segregated by use and speed," where nothing can happen in aggregate, but only in its formal, separate, and designated location, homes, parks, and schools are the only possible places for children to see people, become socialized, and to fail.

To learn and build competency, children need places to safely take risks and fail. But in the automotive city, there is no "room in which to fail" for children in the social realm, because, all too often, that would mean coming into conflict with a fast-moving, two-ton, automobile. In 2020, for suburban families all around the nation, the post-war, suburban dream of a child coming home from school, grabbing a snack, and then playing in the neighborhood until dark is a relic of the past. Now, more often, parents must pick up children at school and chauffer them to organized athletic activities. Because older neighborhoods were denser, and had more mixtures of age, income and use, and benefited from a ". . . loosely organized community supervision, where the parent isn't required to be present at all times and other adults are around going about their business" (Lange, 2018). Jane Jacobs referred to this as "passive surveillance," which provided a social safety net to children if they needed help (Jacobs, 1961). Calling on that safety net is impossible when adults are far away in commercial and office zones or isolated in low-density suburbs. The physical organization of the automotive suburb therefore requires parents to pay someone, a coach or a babysitter, to provide a service which was once performed freely by the community at large (Lange, 2018).

Thus, in the separated, suburban city, children's play spaces are designed to be more easily accessible by adults in cars, rather than by children on foot (Duany et all, 2010). Large parks and schools with regional capacity consolidate play space to combine car trips rather than dispersing play space throughout the city so that every child can walk to a park. As the American Playgrounds Movement in its day advocated for safe, separated space for

children, now many parents advocate for new schools to include a vast array of athletic facilities. And who could blame them? If, for a child aged eight to fourteen years, to reach a park or a friend's home, they must navigate a route without sidewalks, crossing dangerous, high-speed arterials, with little hope of being able to call upon an adult for help along the way, no rational parent with the means to avoid such risk will allow them to walk or bicycle. On a personal level, for a parent to advocate for larger school sites is rational, but at the city scale, in aggregate, this impulse is disastrous.

The trend of school sites growing in acreage is not a phenomenon unique to Montana. From the late 1920's until 2004, professional organizations like the Association for Learning Environments (formerly the Council of Educational Facility Planners, International) have been issuing guidance to school districts for minimum site acreage which many states adopted into law (McDonald, 2010). The most recent iteration of these requirements often dictated the following acreages:

Elementary School

- At least 10 acres of land plus one acre for every 100 students

Middle School

- At least 20 acres of land plus one acre for every 100 students

High School

- At least 30 acres of land plus one acre for every 100 students

Figure 5.02: Minimum Acreage Requirements, CEFPI, (Beaumont and Pianca, 2002)

As discussed in chapter two, although official acreage requirements are no longer promulgated by either the A4LE or the C, school districts have adopted de-facto acreage requirements for new school sites. When selecting a site for new middle schools in Billings, School District 2 sought sites no smaller than thirty acres. In Bozeman's School District 7, bloated acreage standards, driven, in large part, by athletic facilities, currently prevail.

10 acres is usually what we need for an elementary school. . . 30 for middle, 60, 70 ,80 is usually what we look for for a high school with the size of the building, parking, sports fields, all the typical ancillary services. But that's what we've determined is best for our need there is no model or state guidance that says you need to go buy this amount.

Todd Swinehart, Director of Facilities, School District #7, January 07, 2020

LAND USE OUTCOMES OF THE STATUS QUO

Schools, now demanded to take on both the role of parks department and educational institution, must acquire larger sites for any new facility. These kinds of sites; thirty, forty, or, in the case of Gallatin High in Bozeman, fifty-five acres, are only to be found out on the edges of existing development. This means that schools cannot be sited to serve existing neighborhoods, but must be located in anticipation of future development. And when school districts build on the edge of town, development does come.

To the suburban home builder, few things are a greater selling point than a good school. The websites of Billings area home builders prominently feature which schools each subdivision's children will attend. Steve Wells, of Wells Built Homes, and Greg McCall of McCall Homes, executives at two of the largest land developers and home builders in the Billings area, confirmed this to me in interviews.

For move-up buyers and middle families that have school-age children, that's a surprisingly strong factor of where they're willing to build their house . . . At Elder Grove that's probably one of the driving sales factors for Skycrest subdivision is that we're in the

Elder Grove school district . . . people tell us they want to be in the Elder Grove school district, they've heard that it's good. They've heard that there's fewer students per teacher and they want their kids to go there.

Steve Wells, January 03, 2019

. . . having a nice school immediately adjacent to our neighborhood, for our buyer demographic it's a huge asset.

Greg McCall, January 13, 2020

Adherence to large site area requirements for new schools compels districts to acquire sites on the outskirts of town. The decision to do so, and its repercussions, make, "the public school system . . . the most influential planning entity, either public or private, promoting the prototypical sprawl pattern of American cities" In cities across the nation, public schools act as, "advance scouts for urban sprawl" (Beaumont and Pianca, 2002). Montana is not unique in this aspect. Just as farmers in the Yellowstone and Gallatin valleys sell land held for generations to be subdivided and developed, so too goes the agricultural land around Modesto, California.

According to the Stanislaus County (Calif.) Farm Bureau, schools often act as a catalyst for growth patterns that destroy farming. Once new subdivisions attracted by schools move into an agricultural area and make it hard to farm, farmers start looking for other uses for their land. Many of these uses conflict with farming. To survive economically, farmers feel they must sell out to development."

Beaumont and Pianca, 2002

During interviews with city officials, school district officials, and private developers, most acknowledged that school development plays a causal role in driving suburban development. Yet no formal means of coordinating land use and school planning between school districts, cities, and counties currently exists. There are instances, like Ben Steele and Medicine Crow middle schools in Billings and Gallatin High in Bozeman, in which city planning officials advise or even sit on siting committees. But, for the most part, the local jurisdictions of the county, city, and school district are not coordinating on the complex and inter-connected nature of suburban, city-county growth and school planning.

FRAGMENTED LOCAL GOVERNMENT

Throughout Montana, suburban development is characterized by a lack of coordination between local jurisdictions. As often as this is the result of capacity issues or state-imposed limitation, it is also a symptom of perceptions of both the role of government, and of Montana cities as fundamentally rural places within the vast, and inexhaustible wilderness of the American West.

In the Gallatin Valley, 140 miles west of Billings, the cities of Bozeman, Four Corners, and Belgrade, with Gallatin County, have entered into a multi-jurisdictional planning process to manage growth. The "Triangle Plan" as it is known, does not, however, include any formal role for the school districts in the affected area.

The school district doesn't have any responsibilities for land use planning under state law, and we don't have any responsibilities, as a local jurisdiction to tell them where to put a school. So the short answer is no, school siting has not been in the conversation.

Chris Saunders, City of Bozeman January 07, 2020

As a result, new facilities built by school districts often require significant revision of city Capital Improvement Plans (CIP). In the cases of both Gallatin High and Ben Steele Middle, these changes totaled in the millions of dollars of infrastructural outlays. This creates inconsistent development of infrastructural archipelagos on the city's fringe, diverting much-needed funds from otherwise established, deserving, and productive neighborhoods to places where developers built and residents bought knowing that no infrastructure existed. This investment in water, sewer, road and pedestrian facilities further spurs suburban development in the vicinity.

As is the case in many states, Montana school districts are state agents, and as such, are not subject to local planning and zoning laws. A 2017 court decision solidified school districts' exemption from city planning and zoning law. When the Helena public school district sought to demolish an historic school building, residents attempted to block the action on the grounds that the demolition did not comply with the city's historic preservation ordinance. In his decision, the judge cited the Montana Code Annotated to support dismissal of the petition to save the structure:

. . . Montana law expressly prohibits a local government, such as Helena, from exercising "any power that applies to or affects the public school system."

Nocholson v. City of Helena, 2017

While it may be reasonable for a school to have the ability to dispose of buildings should the need arise, it is altogether impossible for a city to comply with this statute. One of the fundamental powers explicitly granted to cities by state enabling legislation, that of zoning, affects school districts profoundly by determining the use and taxable value of land in a school district. Such land use planning decisions have very real

implications for a district's ability to pass bonds and levies, how many students will be within walking distance of a given facility, and how much a district must spend on bussing.

The divide between city and county government in managing suburban growth is the product of several issues: capacity, cultural and political views, and statute. According to several local officials, Yellowstone county government has neither the capacity nor the will to coordinate or plan with other local jurisdictions, regardless of development or population growth. Secondly, the people who typically live outside the city limits in the county, do so because of a desire to pay fewer taxes, and usually see themselves as living in a fundamentally rural place that, by virtue of its historically sparse population, has no need for proactive, comprehensive planning.

Montana is an arid state, access to water and statute regulating its use determine the shape and scope of development. According to Chris Saunders, Community Development Manager for the city of Bozeman, water is the most important factor in managing the growth of Montana cities.

The lever is sewer and water systems because those are biologically necessary. You literally die without them. Especially in the west where water is a scarce commodity. You have it, you grow. You don't have it, you don't. period.

Chris Saunders, January 07, 2020

State law explains the wide disparity between city and county residential development exhibited in the area surrounding Ben Steele middle, where city development is almost three times as dense and as valuable, on a per-acre basis, as county development

(Figure 3.17). Statute regulating water service and use incentivizes low-density, auto-dependent development on the county-city interface.

The way that the state treats on-site water and sewer systems is vastly preferential compared to how they treat any form of consolidated treatment systems, both as far as the requirements for permitting and the expense and effort it takes to put it in place, so the state's approaches to that . . . makes it very easy, in comparison, to building a centralized system, to hack up a bunch of larger-sized tracts and just punch a bunch wells and septics in it.

Chris Saunders, January 07, 2020

Lastly, state legislation severely limits a city's ability to annex land without the consent of the landowner. Therefore, as the Billings MSA grows in population, the city itself has seen a stagnation in population in recent years (ACS 2018). As a result, the city government must maintain roads and other infrastructure necessitated by increasing demand from county residents, while gaining no tax base from these county-dwelling free riders.

HEALTH OUTCOMES OF THE STATUS QUO

As discussed in preceding chapters, school sites have grown in acreage because of the public desire to provide facilities for organized sports which might improve the health of school-aged children. Those chapters also covered the aspects of contemporary school siting practice that contribute to low-density, car-dependent development, and how that development creates environments in which walking or cycling for children is justifiably

seen as unsafe by many parents. Thus, while adults design schools and school grounds to be safe places for children to learn and play, those same decisions create a suburban environment unsafe for children to access those facilities by means of "Active School Commuting," or ASC.

Suburban, car-dependent environments are, what is known as, *obesogenic*, or causal of overweight and obesity. The link between sedentary time spent driving and increased risk of overweight and obesity is also well-documented (McCormack and Virk, 2014). Nationally, the prevalence of overweight and obesity has been on the rise. Billings is no different (PRC Inc., 2020). Yellowstone County, of which Billings is the principal urban area, has higher adult and childhood obesity and overweight prevalence than the nation or Montana (Figures 5.03, 5.04, 5.05 and 5.06).

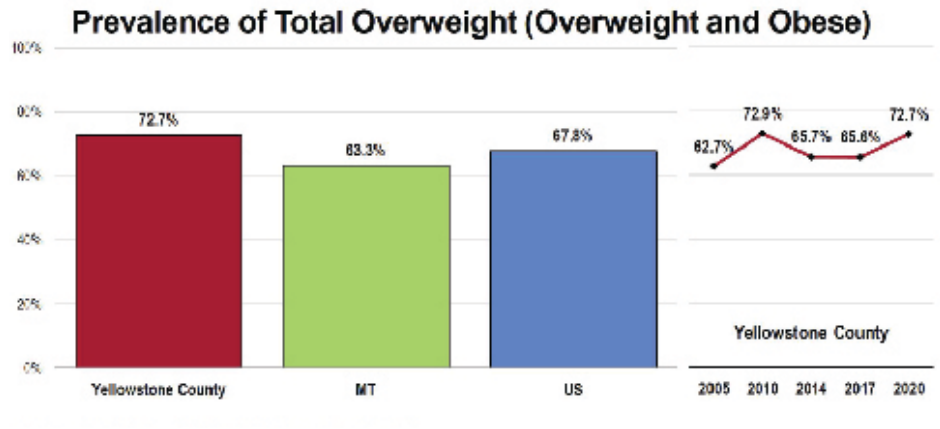


Figure 5.03: Prevalence of adult overweight in Yellowstone County (PRC Inc., 2020).

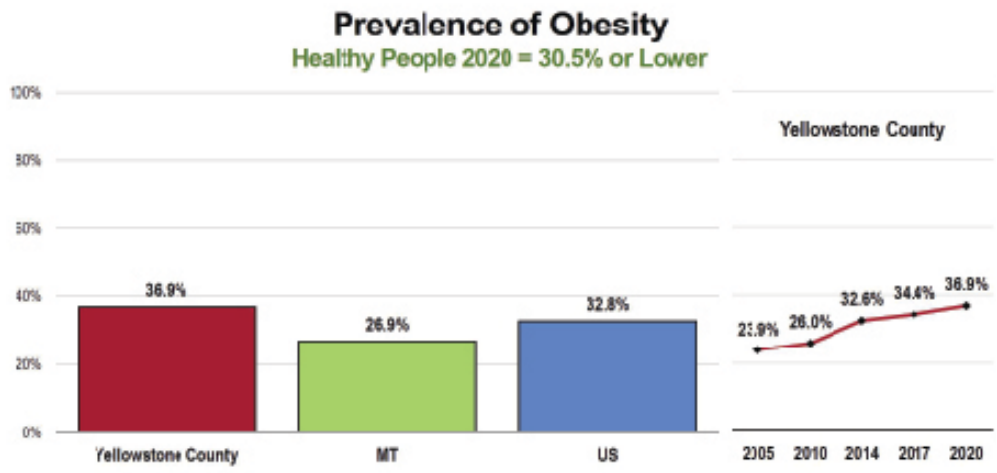


Figure 5.04: Prevalence of adult obesity in Yellowstone County (PRC Inc., 2020).

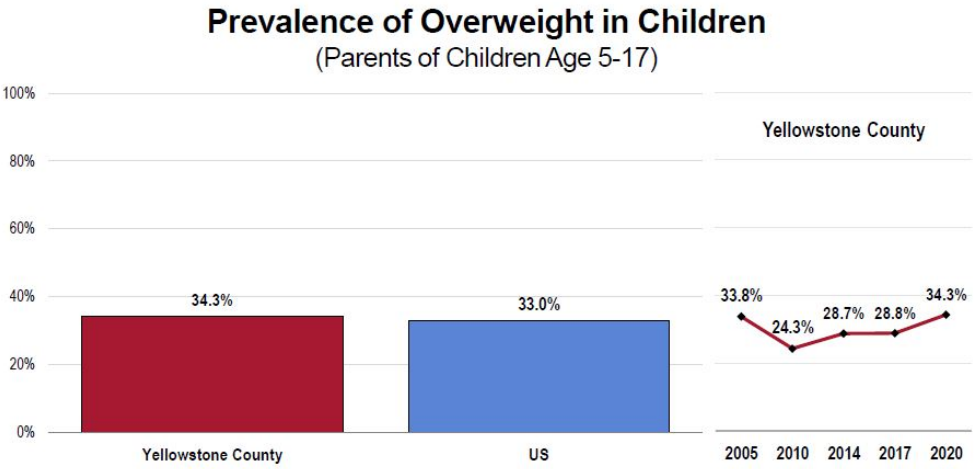


Figure 5.05: Prevalence of overweight in Yellowstone County children

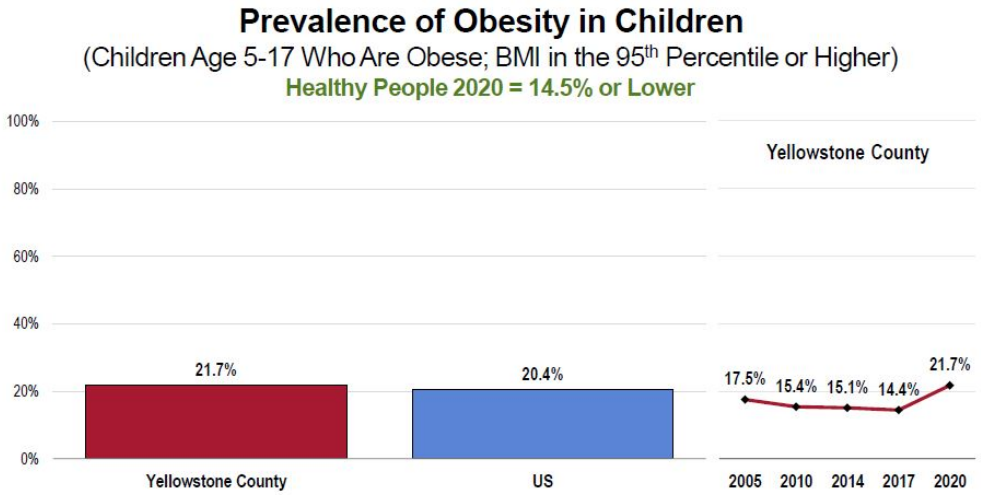


Figure 5.06: Prevalence of obesity in Yellowstone County children

The US department of Health and Human Services recommends that children get one hour of physical activity most, if not all days of the week, for proper physical development. Childhood development of independence and executive function can also be positively impacted by walking or bicycling to school (Brown et all, 2007). Regular physical activity has also been strongly linked with improved academic performance (Vincent et all, 2017).

The percentage of adults in the workforce who actively commute to work on foot or by bicycle in the Billings MSA is significantly lower than that of the MSA's it competes with for economic development, namely Bozeman and Missoula. Where the Billings' active commute mode share is 3.4%, that of Bozeman and Missoula is about three times as high (Figure 5.07). The active commute mode share of Billings inversely correlates with its prevalence of overweight and obesity among children and adults. Beyond health outcomes and fiscal outcomes, which are important in their own right, the ability of Billings to sell itself as a city that offers an active lifestyle on par with Bozeman and Missoula is

seriously undermined by this trend, which has real implications for the area's economic development prospects.

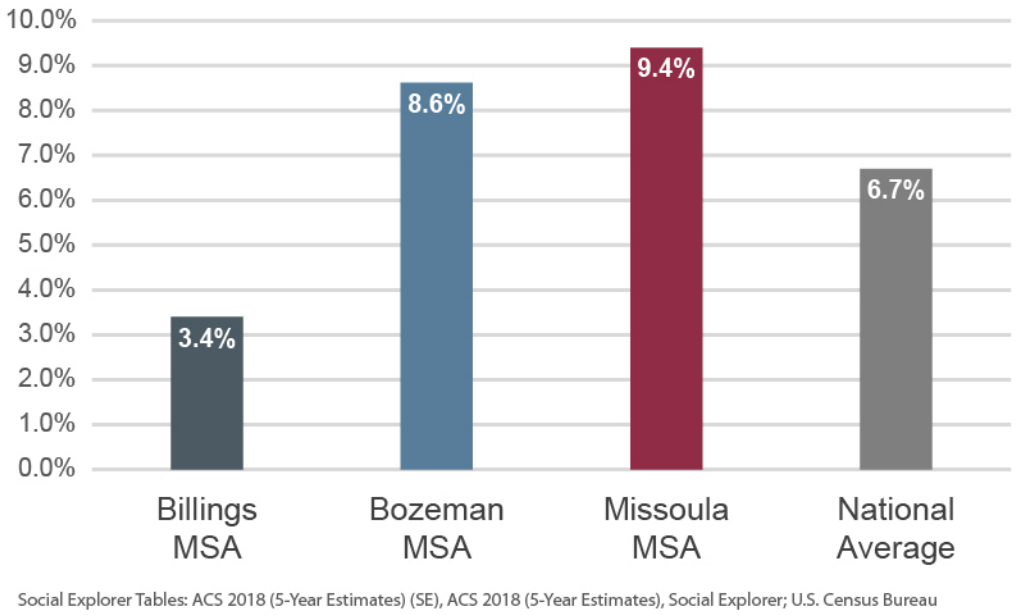


Figure 5.07: Billings active commute mode share relative to others

As I will discuss in chapter six, where walking and bicycling are seen as activities for recreation and children's play, rather than as legitimate means intra-city transportation, useful trips are viewed by most as those made by car. Cities like Bozeman and Missoula provide facilities for working adults and children alike to move safely about the city on bicycle or foot, so more people do, and they are healthier for it.

FISCAL OUTCOMES OF THE STATUS QUO

The fiscal implications of continued status quo school and suburban development are, at worst, disastrous, and at best, detrimental to the solvency of local jurisdictions. Some places, like Bozeman, have foreseen the endgame of today's fragmented development and are coordinating to avoid it, but Billings area governments lack some combination of capacity and political will to do the same.

For Billings School District #2 and Elder Grove District #8, the fiscal outcomes of the status quo are immediately tangible. School District #2 has, for the past two decades, lurched from crisis to crisis. In 2002, a teacher strike over salaries and insurance lasted twenty days (Zellar, 2002). That strike, and associated lawsuits, left a wake of mistrust within the community and still affects operations in the district, according to Craig VanNice, district CFO. Ten years later, in 2012, the district faced threats to its accreditation due to over-crowding and so, to address that crisis, sought to build two new middle schools. As of January 2020, the elementary budget of School District #2, which accounts for all elementary and middle school operations, totaling $120 million annually, is experiencing a deficit of $4.3 million dollars. To address this deficit, the district is proposing to cut music and gifted education programs (Hoffman, 2020).

CFO Craig VanNice attributes the current budget shortfall to the operating costs of those new facilities. In an interview, he cited an elementary budget surplus of nearly $3 million each year until 2015. All building costs for Medicine Crow and Ben Steele were funded through bonds. Their operating costs, however, draw from the elementary budget.

What you see the first year Medicine Crow goes online, that $3 million surplus in 2015 drops down to $300,000. What caused that $2.7-million surplus drop? . . . The most overwhelming factor is the opening of a new middle school with additional FTE [Full Time

Equivalents, i.e., staff positions] attached. You've got new administrators, new custodians, operations and maintenance to keep the place open. Then you go and look at that same chart and look at the year that Ben Steele goes online. All of a sudden, you're in a $ 900,000 deficit. So you went from a $3 million surplus to a $900,000 deficit and almost a $4 million flip in the course of two years. What happened in those two years? Well the most glaring and obvious thing is you built two brand-new, massive, middle schools.

Craig VanNice, January 13, 2020

Mr. VanNice further attributes the current budget deficit to an inability to accurately predict both revenue and costs on the part of the school board. When that body, faced with an accreditation crisis in 2012, sought to build two new middles schools, the budget predictions they made at the time turned out to be inaccurate enough to throw the district into yet another crisis.

. . . it's very tough to predict out even just three years of Montana school financing, there's just too much variability. . . looking at simple assumptions made at the time, ones I could go back now, and at the time say "I can see where they were at," but ten assumptions gone wrong, that's how we are where we are.

. . . what's the long-standing impact of building these middle schools? Well if you talk to anyone here it was absolutely the right choice because we were dealing with accreditation issues, we were dealing with over-crowding and we really didn't have a good plan. The general consensus is, yes, they needed to be built, but what you don't get such a strong feeling on is, ok well five years ago as we were looking at the financial impacts of doing so did we really understand it? I think the simple answer is no.

Craig VanNice, January 13, 2020

Over the course of several interviews with District #2 officials I learned that part of the reason that predicting and understanding operating costs for new facilities is so difficult is that School District #2 does not account for operating costs in the elementary budget on a by-facility basis. The purported reason for this is that it prevents competition for funds among schools, but, in effect, of this policy severely curtails the district's ability to proactively plan, or even assess the performance of its facilities. To explain some of the impacts of this policy, Mr. VanNice gave the example of the district's attempt to analyze the financials of the Career Center, School District #2's vocational training facility for high school students:

It hamstrings us in a unique way because. . . the board chair, she asked about the Career center, "what's the career center cost?" Well it's very similar in high school. We've got some site-specific costs, but over-all it's all just grouped together. So I can probably estimate. When they're, as a board, looking at "does the career center make sense as a functional tool for the district?" and I can't get a straight answer on how much it even costs, that's a big problem.

Craig VanNice, January 13, 2020

One facility-specific cost Mr. VanNice could isolate and did mention was the irrigation cost at Skyview High of $20,000 per month during the summer. As noted in figure 3.03 of this report, Skyview is the district's third-largest facility, by acreage. The two largest facilities, by acreage, are the two new middle schools whose operating costs Mr. VanNice blames for the current budgetary deficit. It is hard to say if those schools'

irrigation costs are as high as Skyview's, but according to Scott Reiter, District #2 facilities director, Ben Steele did have a series of unexpected, and costly, irrigation problems early-on in its operation. Again, without the means to account for the operations costs of such massive facilities, it is impossible to manage them, or to understand the implications of new facilities on the operations budget.

What is likely a more substantial contribution to the operations budget overrun at District #2 is the employees that each middle school requires. CFO VanNice explained in our interview that the district's "labor as a percentage of revenue" is unsustainable. According to him, until recent years, the district's labor as a percentage of revenue hovered around 86%. Since then, it has climbed to 96%. Beyond the staffing costs that any school would incur regardless of location, new, large capacity schools on the suburban fringe also have the added cost of requiring substantial bussing to transport students to and from school.

Although the state of Montana dictates a three-mile walk zone, outside of which bussing is free for students, schools on the edge of development often must provide free "safety bussing" for students within that boundary where no safe route to school exists. This is the case at Ben Steele, where very few roads have sidewalks. It is also true of Elder Grove, which runs eight different bus routes, which is a lot for a school of that size, according to Mr. Schmitz.

Over 70% of our students are bussed. We run eight bus routes. For a district our size, running eight routes is bordering on absurd, but they are all running at over 75% capacity currently. . . we need all eight routes. When I started here we had four routes. . . while bussing is great there is a cost association for the district and there is also a desire for what people consider their neighborhood school, that they're able to go there on the

weekend and play there on the playground if they're able to send their kid safely walking there. The massive downside . . . is that we don't have sidewalks. We're two-lane highways with shoulders. It's just flat out not set up for that kind of pedestrian traffic currently, or even bikes for that matter. We do have a few students that walk or bike and they scare the heck out of me every time I see them cause I drive past them thinking "there's six inches between you and a vehicle."

Nathan Schmitz, January 3, 2020

Extensive use of bussing by Montana schools is an important factor in considering fiscal sustainability because, if Montana follows national trends in bussing costs as it follows trends in school siting practices, those costs are likely to have increased dramatically. A 2002 study found that, in the state of Maine, during the 25-year period from 1970 to 1995, despite a state-wide enrollment drop of 27,000 students, bussing costs rose from $8.7 million to over $54 million (Beaumont, Pianca, 2002). Labor costs also constitute a sizeable portion of any bus system budget, thus likely contributing to the "labor as a percentage of revenue" issues at School District #2.

In addition to bus services provided by schools, which are funded through a combination of state, district and city or county contributions, depending on the district, the city of Billings also provides dedicated bus lines to fill in the gaps of the public school bus system. These four "Tripper" routes are provided by the city to pick up middle school students specifically within the three-mile walk zone, and bus them to their respective schools. The very existence of this bus service is probative of the disconnect between the state policy of the three-mile walk zone and the reality of getting kids to school today in Montana. The Met Bus Tripper routes are funded through local funds, a transportation levy, and federal funding, and, according to city planning staff, have high ridership.

The dependence of new facilities on bussing provided by the district and other local jurisdictions represents a significant operational cost not usually accounted for in the siting process (Beaumont & Pianca, 2002). They also constitute, in effect, a subsidy that enables and incentivizes further suburban development.

As if all of this were not enough, zoning regulations and institutional lending practices that prefer or mandate subdivisions of homogeneous housing type and value tend to generate similarly homogeneous student populations. A subdivision exclusively comprised of starter homes will, for instance, generate more kindergarteners than middle school students (McGee, 2017). A subdivision exclusively comprising higher-cost homes will produce more middle and high school students than kindergarteners, and a multi-family development will likely generate fewer school-aged students per unit (Larco, 2010). A monoculture subdivision of narrow housing types and values may cause temporary blips in student populations of certain age cohorts, which may pass just as soon as districts have expanded to accommodate them. Homogeneous subdivisions also create the need for families to relocate as their lives change, or ability to accumulate wealth changes. Should a family grow to require an additional bedroom or shrink as children move out of the house, they must look outside their neighborhood for smaller or larger housing.

From the city's standpoint, the siting of schools and the kind development they catalyze can be extraordinarily detrimental to efforts to create cohesive growth patterns and, ultimately, contributes to the creation of places that, for the city to provide services like water, sewer, roads and transit, is not fiscally sustainable. Chris Saunders outlined the situation in Bozeman like this:

. . . the county has recognized that ringing the city with a bunch of one acre lots is a loser for everybody because the city cannot reasonably expand, and the use of that

property is locked in at a very low value use for however long . . . if we are going to take it out of a farmland and into something else, then there should be the most public value possible for that exchange. We're losing something in perpetuity. We want to get something that's worth the loss. In our case that usually means urban density zoning, and intense development that's got a better chance of building real neighborhoods and being viable over the long run.

Chris Saunders, January 07, 2020

What Mr. Saunders is referring to in that statement are the key differences between county and city development and, more broadly, residential development of varying densities. Because county residents do not have access to city water and sewer, they often depend on septic systems and well water. Those septic systems and wells are approved by the Montana Department of Environmental Quality (DEQ), which bases its approval upon the site under consideration exclusive of its broader locational or temporal context. The DEQ requires, through the State Sanitation and Subdivision Act, that wells and septic systems have certain distance buffers from each other. In practice, this translates to a minimum lot size for such development of one-half to one acre.

An interview with City of Billings planning staff made clear the consequences of such development. The area in question, 11,000 acres of the Yellowstone River Valley, is productive agricultural land at the western edge of the Great Plains, and emblematic of Montana's rural image, and natural heritage. However, it is likely to be peppered with thousands of privately maintained wells and septic systems. It is also likely that a number of these wells will cease producing water as water tables drop, or septic systems fail, cross-contaminating a number of neighboring wells. High levels of nitrate in the soil from years of farming necessitate complex and expensive water systems. If one considers the twenty,

or fifty-year maintenance liability of this kind of development, which is the proper role of government, the outlook is not good.

If you're not on city services, there's going to be a point in time either with your water or your sewer when you're going to have a major problem . . . It's not if. It's when. It may be a while; the city is going to get dragged into it at some point . . . because stuff is going to stop working or wells are going to drop.

Wyeth Friday, January 14, 2020

THE OLD WISDOM OF SMALL BETS AND INCREMENTAL GROWTH

A city is a system like any other. Its economy, the means by which its citizens move about, obtain what they need to live, and the way its various land uses relate to each other are all connected in complex, or complicated ways. The county suburbs of Billings represent a complicated system that relies on cars for transportation, expensive, computerized systems for water and sewer, and a monoculture of residential subdivisions. I use complicated rather than complex because, as author Charles L. Marohn Jr. explains in his recently published book, *"Strong Towns: A Bottom-up Revolution to Rebuild American Prosperity,"* complex systems adapt to changing circumstances, and complicated systems, like the city and county suburbs of Billings, cannot. The importance of adaptability for a city cannot be overstated. A city that evolves and grows incrementally allows its citizens to build wealth in their neighborhoods, allows land uses to change over time according to economic and demographic changes, and survives what Marohn calls the "infinite game" of city building. In a complicated system, each component can do only

what it was specifically designed to do, relying on the continued stasis of its inputs for survival, and is therefore fragile (Marohn, 2020).

Chris Saunders alluded to this in his earlier quote: *"the use of that property is locked in at a very low value. . ."* (Chris Saunders, January 07, 2020). Conventional, post-war suburban development is unable to evolve because of three of its defining characteristics; its physical block and parcel structure, the way it is financed, and the zoning regulations that govern its use.

Conventional suburbs, both city and county, are often built on streets with poor connectivity by design. Homebuilders know that traffic in the suburbs is dangerous, and therefore protect against it by designing subdivisions that use cul-de-sacs and rarely create direct through streets. In aggregate, this approach, "leads to isolation, auto dependency, oversized traffic arterials, and traffic congestion" (Schroeder et all. p5, 2019). This blunt tool for traffic control not only contributes to a lack of resilience, it exacerbates traffic congestion and safety problems.

For example, the area between Grand and Central Avenues and 56th Street and Shiloh Road exhibits the same inflexibility (Figure 5.08). The street network here is a dendritic, or tree-like, thoroughfare system that uses a hierarchy of streets to funnel traffic from neighborhood streets, to collectors, to arterials. This system concentrates, ". . . both traffic and destinations, like shops and schools, on large arterial roads which must carry all of the through traffic and their size makes a car necessary for most, if not all, trips" (Steuteville, 2019). In dendritic thoroughfare systems, every commercial trip requires a car, thus reducing any convenience offered by small-scale retailers. Arterials are the domain of generic, big-box commercial centers (Duany et all, 2010). A simple summary is that "Big blocks make big-box."

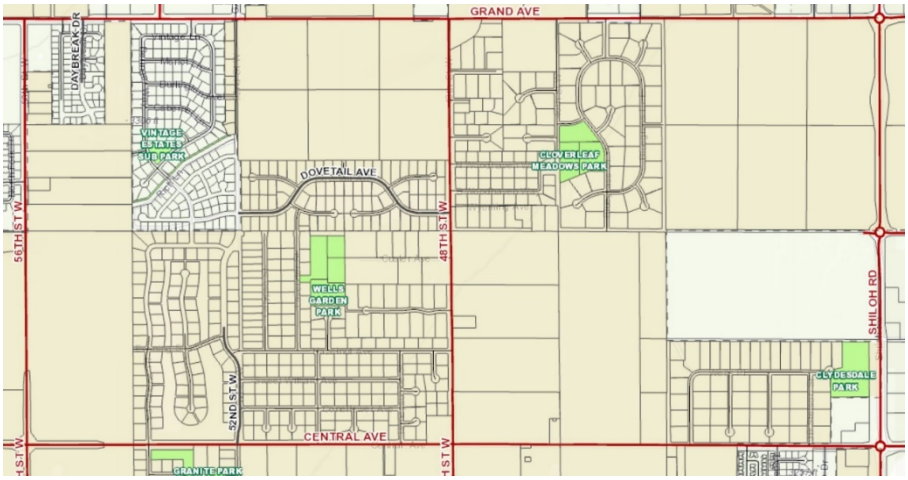


Figure 5.08: Dendritic thoroughfare system, Billings, MT

The interior of a suburban, one-mile-by-one-mile mega-block cannot adapt over time to accommodate change of use or residential density. Winding, interior streets and cul-de-sacs will, by design, never see enough traffic to support commercial use. Here, neighborhood street frontage is suitable only for residential use, and arterial frontage is suitable only for commercial use, making those places where residential uses abut arterials wasted frontage. This wasted frontage also translates into redundant streets within blocks, (Duany et all, 2010) all of which contributes to an unsustainable maintenance liability for local jurisdictions (Marohn, 2020). Unusable frontage can be seen in the widespread construction of high fences and walls along streets like 54th Street West, where the city and school district recently coordinated, at significant expense, to install sidewalks. To walk down this street is a boring experience, with nothing interesting to see, and little protection from high-speed traffic (Figure 5.09). In a one-mile grid, connectivity comes with the nuisance of heavy traffic, and so is avoided by homebuilders. The one-mile, dendritic system is the reason schools must be built on dangerous arterials. It is the reason homes

turn their backs to the public realm and put up high fences, and it is a major cause of Billings' abysmal active commute mode share.

Figure 5.09: Unusable frontage makes a dull pedestrian environment at 54th Street West (picture taken before pedestrian improvements in chapter 3)

The parcels that this kind of development creates cannot adapt to accommodate incremental growth either. No accessory dwelling units or additional residential capacity can feasibly be added. Nor can any corner store survive in such a sparsely populated environment. On a dendritic network, a subdivision of half-acre residential lots can only support single-family homes with a narrow spectrum of property-values. A big-box commercial lot can only support a large, corporate occupant.

Examples of incremental growth are easy to find. In Austin's historic Hyde Park neighborhood evidence of incremental, in-place wealth building is everywhere. Here, zoning and alley-served residential lots have allowed what were once modest cottages to grow into large single-family homes or multi-family buildings, all while maintaining the residential character of the area (Figure 5.10).

Figure 5.10: Cottage front with rear add-on shows evidence of incremental, in-place wealth building in Hyde Park neighborhood. Austin, TX

Rigid financing structures, zoning regulations and private covenants also contribute to the inadaptability of suburban development. Financing for subdivision construction traditionally dictates a narrow spectrum of home value in each development to simplify financing and protect against the perceived threat of a lower-value neighbor devaluing high home values. This is changing in some instances, but not without resistance. Homebuilder Greg McCall told me in an interview that obtaining construction loans for his company's Josephine Crossing subdivision was impeded by the lender's unfamiliarity with mixed-value subdivisions.

Zoning restrictions often dictate a very narrow range of lot sizes within a subdivision as well. The Re:Code Billings effort currently underway will change this, but until then, zones sort new homes into very narrow categories based on value and lot size. This is the case all over the country, where zoning requires that new development be built to its finished state, without room to grow or change. Zoning code often prohibits single family homes from evolving into multi-family duplex or fourplexes. Regulations often

outlaws the use of such homes for business. In many instances, accessory dwelling units (ADU's) are illegal, and parcel layouts often make them impractical (Marohn, 2020).

The trouble with the development happening all over Montana's suburbs is that we build it out to a finished state and set hard rules so it shall never change. This creates a system that is ultimately brittle in its reaction to change. Contemporary suburbs do not just hope for continued prosperity on the 20-to-50-year horizon, they require it. This development pattern requires cheap oil, as well as one parent to remove themselves from the workforce to drive children around. In this brittle city, when the price of oil goes up, families lack the choice to drive less, take the bus, walk or bike. By creating monocultures of same-valued homes, many of which rely on complex systems for basic services, we are, as a city, making what amounts to a big bet. We are betting that our economy will experience nothing but sustained growth for the next 20 years (Marohn, 2020).

The key difference between historic development patterns and the way Americans began to build cities in the twentieth century is our capacity to skip the messy iterations and jump to what we perceive to be the perfect end. Today, we build in large leaps, and we build to a finished state, We envision the end condition – for a building, a block, or a neighborhood – and that is what we go forth and create. . . There is no anticipation of change, incremental or otherwise. The building won't adapt, the block won't evolve, and the neighborhood won't transform over time, at least not easily. As it is built, evermore will it be, a world without end. This commitment to stasis requires a level of cultural hubris bordering on the absurd, particularly given the pace of change we've grown used to in all parts of our society.

(Marohn, p19, 2020)

For the City of Billings and for District #2, which are both currently experiencing serious budget deficits (Rogers, 2019), measuring the relationship of private value to infrastructure maintenance liabilities is paramount to restoring sustainable budgets. To do this, local jurisdictions need to ensure that new growth supports, in their tax base, the services it requires. Marohn suggests cities use the metric of value per acre to achieve this. The practice of measuring value per acre is common in agriculture, but Marohn argues that doing so with urban land should become the new standard for local jurisdictions.

> *. . . each iteration of new growth creates enormous future liabilities for local communities, a promise that the quickly denuding tax base is unable to meet. Not only did these new areas need police and fire protection, street lights, libraries, and parks, but those miles of roads, streets, sidewalks, curbs, and pipe; all those pipes, pumps, valves, meters, culverts, and bridges would eventually need to be fixed or replaced.*
>
> *Marohn, p.100, 2020*

To illustrate this point, Marohn uses the example of Lafayette, Louisiana, which, in 1949 had five feet of pipe per person. In 2015, that number had jumped 1000% to 50 feet per person. Lafayette also had 2.4 fire hydrants per thousand people in 1949, and then 51.5 per thousand in 2015; an increase of roughly 2000%. During that time, median household income in Lafayette grew only 160% (Marohn, 2020). This makes it plain to see that the private tax base has not grown at the same pace as the public maintenance liability of all that infrastructure.

While Marohn stops short of recommending a value per acre that local governments should target for new development, the metric can provide context to inform development agreements, annexations, and evaluation of any subsidies sought out by new developments.

It may also be beneficial for a municipality to understand the value per acre of different areas of town to prioritize maintenance. Chapter three of this report discussed the disparity of value per acre in city and county development in the area surrounding Ben Steele (Figure 3.17). County development in that area was three times less valuable than city development, and, while the city does not currently provide services to county development in that area, should the need ever arise for county subdivisions to be annexe, value per acre analysis clearly indicates that providing services to such low value areas may be unsustainable from a fiscal perspective.

School districts also have a clear stake in the value per acre of new development. Both Nathan Schmitz of District #8 and Craig VanNice of District #2 cited "tax fatigue" as a major obstacle to passing school levies and bonds. If the city and county continue to approve development that cannot support even the maintenance of the roads it's built on, there is little hope for its ability to fund a quality public school system.

The most relevant lesson from Marohn's book for school districts must be that of the "old wisdom of small bets." Every district official I spoke to bemoaned the unreliability of the demographic projections schools use to plan facilities improvements and expansions. That, combined with the inability of District #2 to measure operating expenses on a per-facility basis, suggests that a conservative approach would be to build smaller schools.

While it is not the focus of this report to discuss the pedagogical implications of large versus small schools, the benefits of smaller schools are well known even to those who promote the construction of large schools. In an interview with former District #2 facilities director, Lewis Anderson, when I asked his stance on school size he said,

We believe that smaller schools would be great if you could afford to run them, but the optimum number that we strive for is 400 on the elementary and 750 on the middle

school. That's the optimum number for efficiency, as far as principals, assistant principals, secretaries, custodial. Anything under 400 on the elementary, it's more expensive, per student to operate that school.

Lewis Anderson, January 20, 2020

Considering District #2's inability to account for operation expenses on a per-facility basis, Mr. Anderson's assertion as to the efficiency of larger facilities must be seen as an expression of prevailing conventional wisdom. This conventional wisdom also promotes large high schools so they can be competitive in state sports (Todd Swinehart, January 07, 2020). The primary reason for the historical shift to and continued construction large school sizes, especially high schools, is efficiency (Feldman, J. (2011). But Conrad Stroebe, who served over twenty years on the District #2 school board questions that logic. He contends that District #2 would save money by building smaller schools closer to town. With respect to Ben Steele, Stroebe told me, "What little they would have saved in land cost, they sacrificed in ongoing operations cost" (Conrad Stroebe, April 13, 2020).

In my interview with City of Billings planning staff, they mentioned that District #2 had failed to pass a bond to build a fourth high school. The district has a reputation for unreliability in passing such bonds, but this failure may have been a blessing in disguise because neighboring Lockwood School District #26, after years of sending its students to District #2's Skyview high school, is now constructing its own 700-student high school, leaving District #2's high schools under capacity.

Given the volatility in District #2; the failure of voters to pass levies and bonds, the unreliability of student population projections, and the inability to measure operating costs, Marohn would argue that the responsible thing to do would be to embrace the old wisdom

of making small bets on small schools, growing the district's capacity incrementally, rather than in giant, blind leaps.

Chapter 6: Precedent

THE NEIGHBORHOOD UNIT

Planners, architects, and city-makers of all stripes have long studied the school as a unit for creating physical and social neighborhoods. Elementary schools are often referred to as the "anchor" of a neighborhood's social cohesion (Duany et. all, 2010) and of a neighborhood's residential home value (Beaumont and Pianca, 2002). One of the earliest, and best-known studies of schools and neighborhoods is Clarence Perry's "Neighborhood Unit," published by the Regional Plan of New York and its Environs in 1929.

Perry's Neighborhood Unit proposed that, while most residents within a neighborhood unit would be employed in the central business district, and although such trips as museum visits or shopping for specialty items like pianos may require a journey beyond the unit, a number of local, commercial, and civic uses could be arranged within a neighborhood. The universal components of each neighborhood unit are the following:

(1) the elementary school,

(2) small parks and playgrounds,

(3) local shops,

(4) residential environment

(Perry, 1929)

Perry adapted the neighborhood unit to industrial, multi-family, and suburban, single-family contexts, all of which generally conformed to a "service sphere" of a quarter-mile radius around a school inscribed into an area measuring one-half mile by one-half mile, or about 160 acres (Figure 6.01). Perry also argued that a school site with all its attendant play area (8+ acres) was too large to be integrated into a "well-planned street system." He promoted the idea of breaking that play area into smaller parks and dispersing it about the neighborhood unit to provide easy access to playgrounds by children on foot (Figure 6.02). Perry recommended, to calm traffic within the neighborhood and near the school, that arterial streets form the boundaries of the half-mile area. He then placed all neighborhood commercial so as to front onto those arterials.

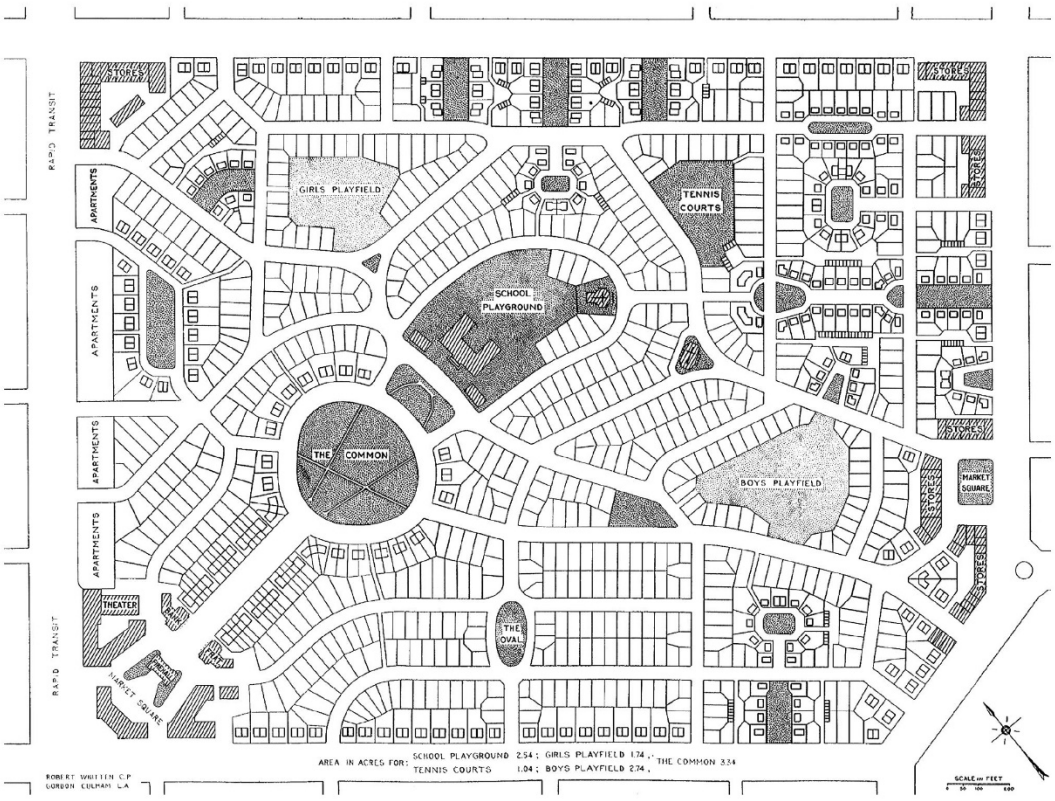


Figure 6.01: Suburban neighborhood unit (Perry, 1929)

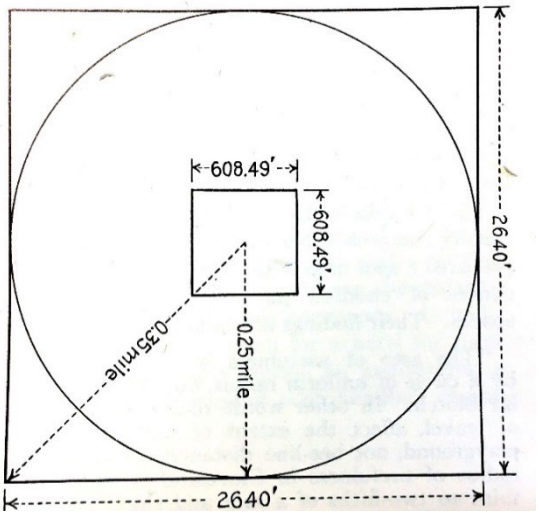


Figure 6.02: "A school yard large enough to meet neighborhood play needs adequately is too large to insert in a well-planned street system." (Perry, p46, 1929)

CENTRAL HEIGHTS NEIGHBORHOOD

A great example of a subdivision designed as a neighborhood unit is the Central Heights neighborhood in Billings, Montana. Arterials bound all but its southern edge, which is defined by a collector street. All commercial uses in the development are located along those arterials, at the edge of the neighborhood, giving the school a buffer of about 300 feet from dangerous traffic, a buffer that Ben Steele does not enjoy. The most noticeable difference between Central Heights and the 1929 neighborhood unit is that Central Heights has long blocks, a trait typical of post-war subdivisions. Central Heights residential lots are served by alleys, but these alleys serve as trash collection rather than vehicular access, as the vast majority of garages load to the street (Figure 6.03). Play space in the neighborhood is divided between the school grounds in the northwest, and Sacajawea Park in the southeast Residential density in Central Heights is four units per acre, with a value of $850,000 per acre.

	Character	Gross Acres	%	Units	Units Per Acre	Value	Value Per Acre
Residential Single Family		123.6	75%	466	3.8	$ 98,413,516	$ 796,353
Residential Multi Family		4.4	3%	55	12.2	$ 5,344,195	$ 1,227,048
Commercial		19.2	12%	57	3	$ 21,259,792	$ 1,109,592
Park		18.8	11%	n/a	n/a	n/a	n/a
Total		166	100%	576	3.5	$125,017,053	$ 849,907

Figure 6.03: Central Heights neighborhood unit

The Neighborhood Unit model at Central Heights falls short in application to Central Heights and contemporary development in several aspects, the first of which is its physical bounds. When Clarence Perry unveiled the Neighborhood Unit concept, the average household size in the New York area was 4.5 persons (Perry, 1929). Today, in the Billings MSA, the average household size is just 2.4 persons (ACS 2017). This, combined with a trend toward developments of lower residential density, means that a school like Central Heights Elementary must draw from a much larger area than one half square mile to enroll its target capacity of 304 students. The current school boundary is about four times the area of the Central Heights neighborhood (Figure 6.04).

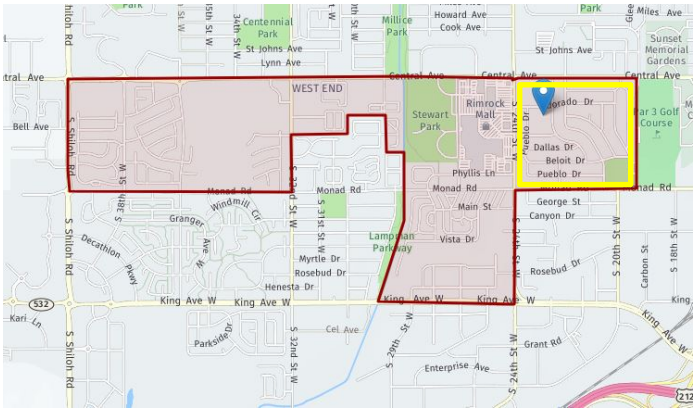


Figure 6.04: Central Heights Elementary school boundary, annotated (MT HomeTownLocator)

The second drawback of the Neighborhood Unit is that it relies on a dendritic thoroughfare system. Perry even describes the ". . . tree-like design for the street system" in his original publication (1929) of the concept (p.39). The dendritic thoroughfare system created by this design makes easy and safe pedestrian travel within the neighborhood, but also creates dangerous, high-speed arterials at its exterior that function as pedestrian barriers.

COLUMBIA, MARYLAND

A "new town" development of over fifteen thousand acres, Columbia, Maryland provides several useful insights into the intersection of community building and post-war suburban development practices. I completed the following case study of Columbia in partnership with Zia Lyle in the fall of 2019 as part of required course work in a "Design of New Communities" class at the University of Texas at Austin.

As a planned community with an intended population of about 100,000 residents, Columbia sits within Howard County, about equidistant from Baltimore and Washington D.C. (Figure 6.05), Columbia was created in the 1960s as a response to postwar sprawl development (Forsyth, A. 2005). The Rouse Company, founded by James Rouse, a real estate developer who emphasized studying and promoting social interaction in his work, developed the new town. He believed that the purpose of community building must be the improvement of mankind. The Rouse Company is well-known for its completion of one of the first ever suburban shopping malls, Harundale, just south of Baltimore in 1958 (Forsyth, A. 2005).

The two guiding principles of Columbia were to "respect the land," and to create a "complete and balanced community" (Forsyth, A. 2005 p. 114) On the first, the planning and design team drew heavily from Ian McHarg's "Design with Nature," implementing conservation development tactics like cluster development and riparian preservation of streams, floodplains, and natural landscapes. Neighborhoods developed in earlier phases also featured parkways and pedestrian rights of way branching from ubiquitous cul-de-sacs to elementary schools and neighborhood centers.

To create a “complete and balanced community,” Columbia was planned as a racially and economically inclusive new town, open to buyers and renters of all races, an uncommon practice for that time. Economic diversity was ensured by providing a diversity of housing typologies ranging from single family homes in the neighborhoods, to multi-family towers in the town centers. Where conventional subdivisions provided homes within a narrow price range, often as a requirement of institutional funding, Columbia created economic diversity at the neighborhood scale, with small groups of similarly valued homes on cul-de-sacs in an effort to promote social cohesion (Forsyth, A. 2005).

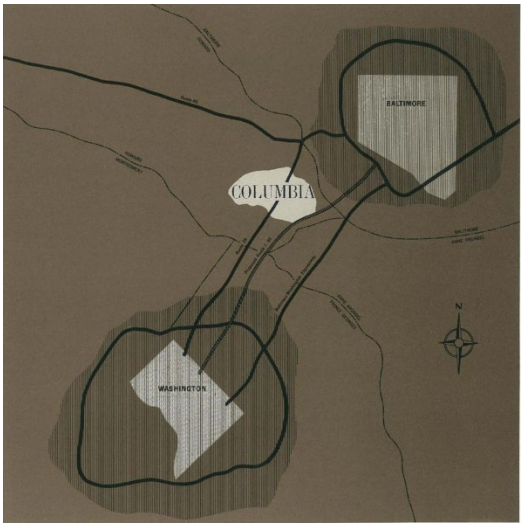


Figure 6.05: Columbia, MD location and scale

To organize a development of such large scale, the Rouse Company conceived of a hierarchy which grew from the home itself, to the neighborhood, to the village, to the town (Figure 6.06). Villages roughly correlated to development phases, having ten in total, the first of which, Wilde Lake, was completed in 1967 and the last, River Hill, in 1990. Each village contained a “Village Center” which hosted a middle or high school, small shops, interfaith spaces, recreational facilities, and a community center. Economics at the

time of provided a convenient alignment of the population necessary to support both a supermarket and a high school. Thus, villages were designed to accommodate about 3,500 families, yielding, at the time, a population of about 12,000 (Forsyth, A. 2005).

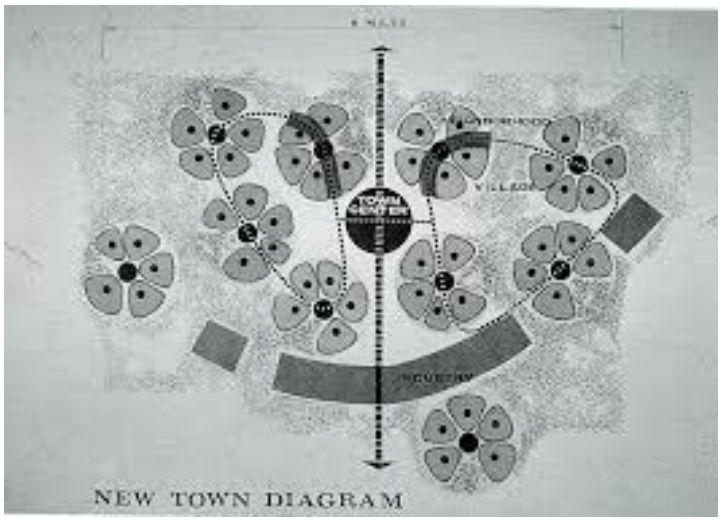


Figure 6.06: Columbia organizational structure

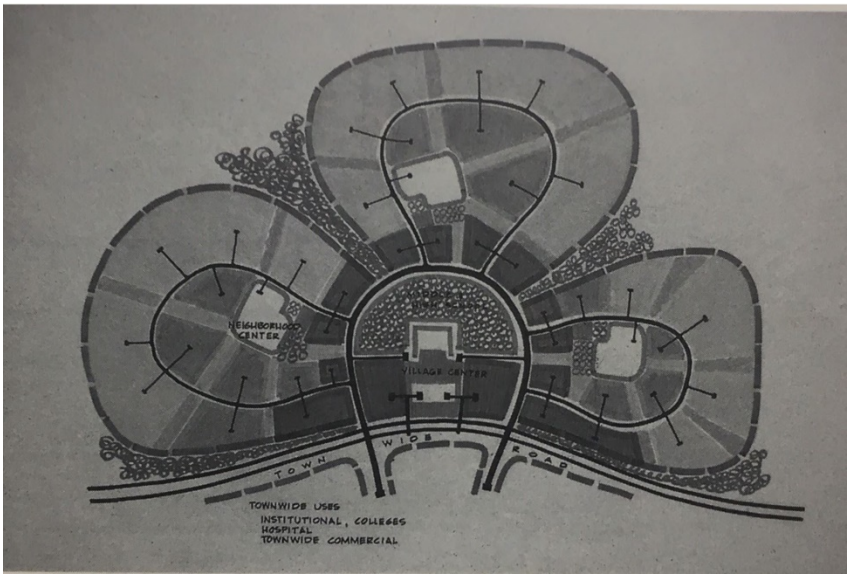


Figure 6.07: Columbia village structure

As the primary unit of organization within the new town development, the neighborhood provides some examples of innovative design features at Columbia which would later become the foundation of status quo development today. Bryant Woods neighborhood was the first developed, and features clusters of relatively small developable lots. Neighborhood centers hosted rentable facilities for clubs, classes or church services and childcare cooperatives staffed by neighborhood volunteers. Convenience stores, swimming pools, parks, playgrounds and elementary schools could all form a node of activity at these centers to which children could walk without crossing a major road (Figure 6.07). Pedestrian rights-of-way behind homes and at the ends of cul-de-sacs provided a separate, well-connected network interlaced with a hierarchical, dendritic vehicular network of cul-de-sacs, collectors, and arterials.

Figure 6.07: Bryant Woods: Good pedestrian connectivity. Bad vehicular connectivity. Low density.

The separation of the pedestrian network, which was intended to be used mostly by children, and the vehicular network, for adults, is a continuation of the playgrounds movement's age-segregation of the city in a pursuit of improved safety. The link between

the two is Radburn, New Jersey. There, also in the pursuit of a new model of urban domesticity in the "motor age," designers Clarence Stein and Henry Wright created some of the first American "superblocks" in order to separate recreational space for children from the dangers of the automobile. Homes in Radburn are served on one side by a narrow vehicular right of way without sidewalks for access to garages and trash collection. The other side of each home is served by a pedestrian path (Figure 6.08). I say "side" of homes because this layout, while attempting to make the pedestrian path the front and the vehicular access the rear, fails to do so. Because the paths are explicitly designed for recreation or use by children, the pedestrian network provides connections only within the development, so any adult behind the wheel of a car will arrive via the service alley. These service alleys, basically hammer-head turn-arounds, blazed the trail for innumerable cul-de-sac developments to come.

Figure 6.08: Pedestrian networks for internal circulation only at Radburn, NJ (left) and Blackstone Estates in Billings, MT, just south of Ben Steele (right)

At the heart of Columbia is the "Town Center" with one of Rouse's signature malls. This was intended to be the commercial hub of the whole development, but changing economics and demographics would alter the layout of future neighborhoods and villages. Later phases of residential development discarded the conservation development tenants of earlier phases, losing the high pedestrian connectivity and maintaining low density and vehicular connectivity to maximize profit on land (Forsyth, A. 2005). Figure 6.09 shows images taken from Ian McHarg's "Design with Nature," the image at upper-left depicts a conventional suburban development pattern that spares no natural space for common use. The image at lower-left depicts a clustered, conservation development model which preserves ample space for shared recreational use, infrastructural use as drainage, and preserved natural habitat. Those diagrams correlate to the earlier development pattern of Wilde lake at bottom-right, with greenways and pedestrian paths at rear of lots, and the later development at upper-right which has shed that natural space and become much like a typical subdivision that we might recognize today.

Figure 6.09: Ian McHarg's diagrams of conventional development (upper-left) and conservation development (lower-left) and corresponding developments in Columbia, MD

Commercial uses at village and neighborhood centers were eventually undermined by regional commercial centers because of the development's low residential density and prioritization of vehicular transportation, requiring residents to drive, who, once in their cars, chose the regional retail over the local. The same dynamic, a low residential density of only 2.3 units per acre, could not support neighborhood elementary schools, causing the developer to remove them from later phases. The town center shopping mall has undergone several iterations of growth and stagnation, and is now being planned as a new-urbanist redevelopment, mixing commercial and residential uses (Forsyth, A. 2005).

Columbia, along with its predecessors, offers several lessons to inform future suburban development. The Rouse Company's goal of allowing every child in the new town to walk to school was undone by its low density, which could not produce either the tax base or the student population to support the originally conceived distribution of school facilities. To the extent that "respecting the land" depended upon low density, the development failed to deliver the walkable utopia it promised, as great travel distances and a lack of transit options necessitated vast parking lots that made walking impractical for every-day trips. Changing economic and demographic trends beyond the control of the developers also contributed to this failing.

The goal of a "complete & balanced community" was a partial success. Various indicators drawn from census data show that, although racial wealth gaps persist in Columbia, a greater level of racial integration has been achieved. Data also show a lower-than-average percentage of residents experiencing housing burden. This is primarily a result of two factors: Columbia's openness to renters and buyers of all races from its inception, and a greater diversity of housing types within the development.

For the purposes of this report, the most salient aspects of Columbia are the inability of its commercial, civic, and residential areas to adapt to changing economic and

demographic conditions, namely that of commercial areas to remain profitable and of residential areas to adapt over time to accommodate the growth that would be necessary to support local commercial uses or neighborhood schools. The second, and perhaps most important lesson from Columbia is that a pedestrian network designed only for children and recreation, segregated from the world of adults, which provides only internal circulation, coupled with a dendritic vehicular network, requires nearly all trips to be made in cars, thus requiring even local commercial to provide immense parking lots, making useful pedestrian trips impossibly distant (Forsyth, A. 2005).

JOSEPHINE CROSSING

On the banks of the Yellowstone River, less than two miles south of Central Heights, the little neighborhood of Josephine Crossing provides a glimpse of what fiscally sustainable suburban development might look like in the Billings housing market. Developed and constructed by McCall Homes, Josephine Crossing is one of the first and only New Urbanist subdivisions in the Billings area. It features a diverse mix of rental and ownership units, housing types and values, ranging from townhomes valued at $150,000 to large, single family homes valued at $700,000, a common characteristic of Traditional Neighborhood Development, or TND (Duany et all, 2010).

Of the 102 acres comprising the original parcel that the neighborhood was built on, only about 66 were developable, the remainder of which McCall dedicated to the city as parkland which connects to a larger network of trails along the north bank of the Yellowstone River. Because this original parcel was a “flagpole” lot, Josephine Crossing has only two vehicular connections to its surroundings.

Blocks at Josephine Crossing are relatively short, averaging about 2,000 feet in perimeter, and longer blocks are bisected by pedestrian passages. Rear alleys serve every block, making curb cuts and pedestrian-vehicular conflict points rare. Streets feature traffic calming elements like mid-block and intersection curb bulb-outs, and on-street parking. Where many contemporary Billings subdivisions have no sidewalks, a sidewalk on one side of streets, or sidewalks directly adjacent to the curb, sidewalks like both sides of streets at Josephine Crossing, and are buffered from the street by planted furniture zones with street trees.

The neighborhood's design makes smart use of parks to enhance property values (Figure 6.10). A single-loaded street running along the southern edge of the developable land creates park-front property and grants uninterrupted public access to the river trail system. Small parks arrayed along several north-south streets create small, shared squares and maximize the number of park-fronting lots in the development. The value of these parcels is about 30% higher than their non park-fronting neighbors. Random samples of each housing type taken from the Yellowstone County Treasurer's website reveal a value per acre at Josephine Crossing of $1.8 million (Figure 6.10). With a 10% margin of error and a 90% level of confidence, this value is 1.6 times greater than contemporary city development and 4.8 times greater than contemporary county development in the Ben Steele area (Figure 3.17).

	Character	Gross Acres	%	Units	Units Per Acre	Value	Value Per Acre
Single Family		33.8	33.3%	203	6	$ 57,070,067	$ 1,688,117
Single Family Parkfront		24.8	24.5%	124	5	$ 42,003,569	$ 1,690,839
Cottage		4.3	4.2%	50	12	$ 10,828,327	$ 2,509,721
Attached		0.8	0.8%	25	31	$ 4,932,917	$ 6,085,812
Townhomes		2.0	2.0%	31	15	$ 6,561,841	$ 3,235,354
Park		35.7	35.2%	n/a	n/a	n/a	n/a
Total		102	100%	433	6.6	$121,396,721	$ 1,836,852

Figure 6.10: Josephine Crossing, Billings, Montana

Chapter 7: The School Zone

The "School Zone" is a tool that I hope will help local jurisdictions manage suburban development by creating sustainable infrastructure liabilities for cities and counties, providing resilient tax bases and student populations for school districts, and build neighborhoods in which parents can, in good conscience, let their children move about the city with a reasonable expectation of safety.

The School Zone creates a 1.5-mile radius area around any school where development is likely to continue to occur. Within this area, subdivisions must adhere to certain development standards targeting connectivity, park land dedication, use mix, and density. The school zone also includes special taxation tools that may be used to fund infrastructure development within its boundaries. Jurisdictions should vet each requirement for its appropriateness to their local context and apply them to as high a standard as is practical. If all the requirements are implemented within a School Zone, their combined effect will, in time, yield a neighborhood center around which value and community can agglomerate.

Section one covers the "hundred-year decisions" essential to managing suburban, greenfield development: rights-of-way, blocks, and parks. Section two deals with use zones within the School Zone. Section three covers the school site, strategies for acquisition of new sites with and without the designation of a School Zone, and development strategies for lands that districts may have already acquired.

SECTION 01: NETWORK STRUCTURE OF THE SCHOOL ZONE

As discussed in chapter three, the 1.5-mile walk zone represents a much more reasonable distance for a child to walk in Montana's climate than the state walk zone of three miles. Canada's public schools use this travel distance, outside of which bussing is free to the student (Vitale et all, 2019).

This section has several objectives: to create infrastructure investments that are themselves armatures for future investment; to create a network that allows a greater segment of the population to safely traverse the city; and to maximize the walk zone ratio of the School Zone.

Of the people living within 1.5 miles of the school "as the crow flies" as many as is practicable should live within 1.5 miles of that school "as the child walks," promoting the healthy behavior of active school commuting and saving school districts significant bussing costs. The existence and character of routes by which students access their school will be determinative of a parent's decision to allow their child to walk to school (Vitale et all 2019). This section deals with the streets and blocks in the School Zone, what the Bozeman planning department refers to as "century decisions."

What we try to look for is what we call "century decisions." What do you have to live with for the next hundred years? Street networks are century decisions. Park placements are century decisions.

Chris Saunders, January 07, 2020

Currently, the Billings subdivision regulations contain sections regarding block structure and street network connectivity. They are, however, overly vague and leave ample room for ad hoc interpretation. Sections 23-405 and 406 read as follows:

B. **Rights-Of-Way for Internal Non-motorized Connections:** Public rights-of-way for internal non-motorized connections within blocks will be required when essential to provide circulation or safe access to schools, playgrounds, shopping, transportation and other community facilities. Pathways shall also be installed at the end of cul-de-sacs where deemed appropriate.

Figure 7.01: Section 23-405-B of the Billings subdivision requirements

2. Relation to Developed Areas: The subdivider shall arrange the streets to provide for the continuation of streets between adjacent developed properties when such continuation is necessary for the convenient movement of traffic, effective provision of emergency services and efficient provision of utilities. Such provision may be waived where the adjacent land use is incompatible with the proposed subdivision, or when prevented by topography or other physical conditions.

Figure 7.02: Section 23-406-2 of the Billings subdivision requirements

As the reader may infer, requiring pedestrian and street connections "when essential," "where deemed appropriate" or "when necessary" is ambiguous, leaving the subdivision and development process open to broad, administrative interpretation by planning staff and negotiation by developers, which slows the development process, and yields inconsistent connectivity across subdivisions. This section seeks to avoid those outcomes by providing clear, simple, and measurable requirements that are easy to comply with and interpret.

Century Decisions: Street Grid

Chapter three discussed analysis of Ben Steele middle school and the 1.5-mile area around it with respect to the portion of students within its boundaries who have a reasonable

option to walk to school. That analysis found that, of the nearly 9,300 households in the Bens Steele school boundary, about 1,700 live within a direct 1.5 miles of the school. Of those, about 950 live within a 1.5-mile network distance, irrespective of pedestrian facilities. This gives that 1.5-mile area a "walk zone ratio" of 0.57 (Figure 3.16). Much of that area is laid out on a dendritic thoroughfare system, whose weaknesses are detailed in chapter five of this report. Ben Steele's School Zone is about forty percent developed. The street grid of the remaining sixty percent of development will, among other things, determine how many students will ever have a reasonable option to walk to school.

The following series of figures shows what is known in GIS parlance as the 1.5-mile "service area" of a facility (a new school) at the center of grids of varying size. The accompanying images of places where such grids exist show the character of development and streets that those grids yield.

Figure 7.03 shows a one-mile, Jeffersonian grid like much of the United States was laid out on. This is the "thoroughfare" in the dendritic thoroughfare system discussed in chapter five. It does not account for any of the "branches," or neighborhood streets that typically would curve and wind from these thoroughfares. Thus the area coverage percentage of fifteen percent is not an accurate predicter of the percentage of households that would be within the walk zone of this facility, but subsequent, finer grids will illustrate the larger point of this exercise; that a finer grid provides better connectivity. Note the green, diagonal right-of-way added to the grid at right. Dubbed the "Park Path," these rights of way extend at 45-degree angles away from the school to augment its service area. I chose to include these because, even in a perfect, infinitely fine grid, the service area of a center point is confined to a square inscribed in a circle of the same distance radius. This constraint becomes clearer as the grid figures progress. The important take away here is that diagonal

rights of way significantly increase the School Zone's walk zone ratio and yield greater returns in area coverage as the grid becomes smaller.

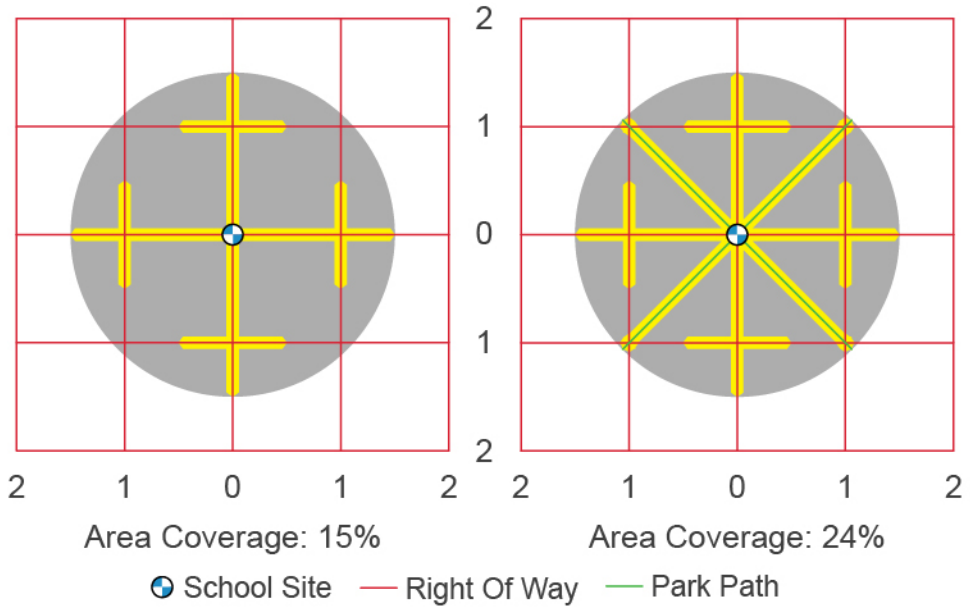


Figure 7.03: 1.5-mile service area of a school on a 1-mile grid street network

Figure 7.04: Character and mobility outcomes of 1-mile grid street network in Meridian, Idaho. (Google Maps)

Meridian, Idaho, in the Boise MSA, has built out on a one-mile, dendritic thoroughfare system, with predictable results. The thoroughfares on the grid must carry all through traffic and are therefore prone to congestion. Their high capacity and high speed limits also make them uninteresting, uncomfortable, and unsafe for walking (Speck, 2018). Poor connectivity within the one-mile grid cells also makes driving almost mandatory for even the simplest trips (Duany et all, 2010). Note also the placelessness visible on these arterials, where corners are dominated by gas stations and residential frontage is treated with high fences as can be seen on similar thoroughfares in Billings. This is a glimpse into Billings' future, given its current trajectory (Figure 7.04).

A grid of through streets at every half-mile provides significantly better area coverage than the one-mile grid. Diagonal Park Path rights-of-way also provide a service area increase of eleven percent, a two-point jump from the one-mile grid's Park Path dividend (Figure 7.05).

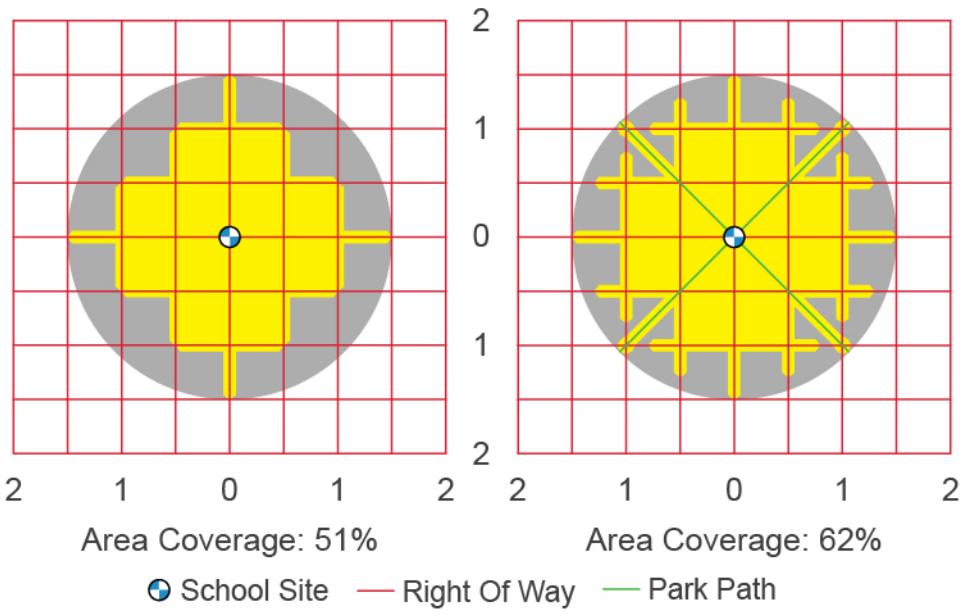


Figure 7.05: 1.5-mile service area of a school on a 0.5-mile grid street network

To see the character of the streets that a half-mile street network creates, we need go no further than the area including the Central Heights neighborhood which was studied in chapter four of this report. Confined by Grand Avenue to the north, Monad to the south, 24th Street to the west, and eighth street to the east it is roughly connected by through streets at every half mile. Although this grid does produce better street sections and pedestrian experience than the one-mile dendritic network, it does still rely on arterials in some instances (Figure 5.06).

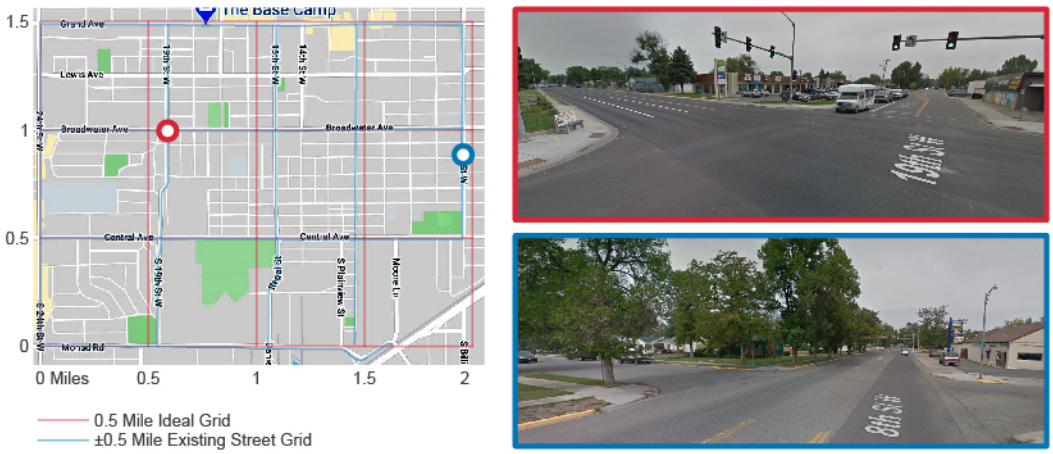


Figure 7.06: Character of 0.5-mile grid street network in central Billings, MT

A network of quarter mile through streets yields the greatest service area coverage of any of the three grids explored here. It is reasonable to assume that an even finer grid network would yield better connectivity, but for reasons explained later in this chapter, and to balance the benefits of connectivity with those of granting some flexibility to developers, a network of quarter mile collectors is the recommended street layout for a School Zone.

The dividend of introducing the diagonal Park Path is greatest on the quarter mile grid, increasing the school's 1.5-mile service area by eighteen percent (Figure 5.07).

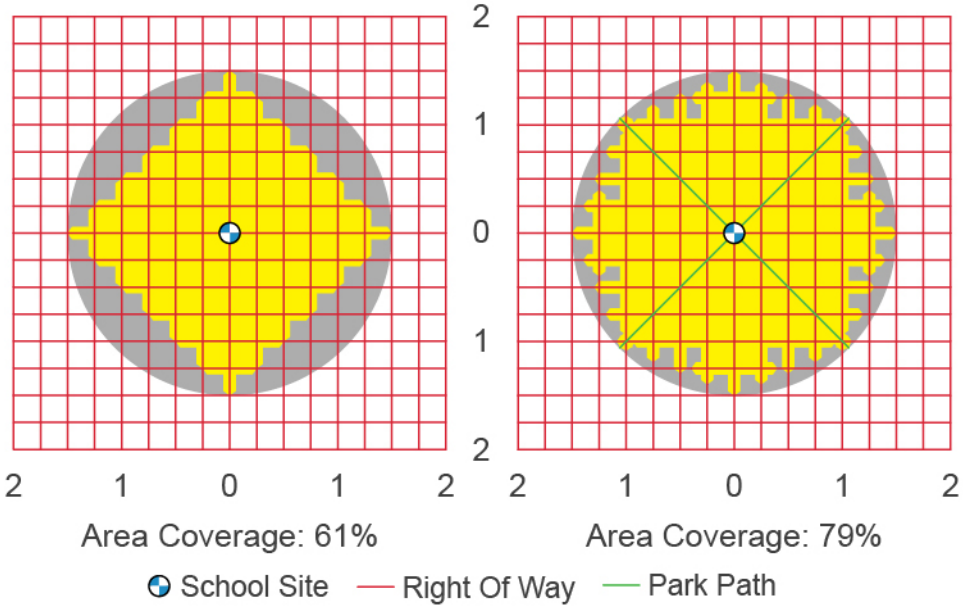


Figure 7.07: 1.5-mile service area of a school on a 0.25-mile grid street network

The character outcomes of a distributed, quarter-mile grid can be seen in historic neighborhoods all over Montana. Even in instances of apparent discord, as in the "Slant Streets" of Missoula, the quarter-mile street network is still present. These streets need not be as large as arterials, as traffic loads are dispersed amongst them, which creates an enjoyable, comfortable pedestrian experience (Speck, 2018). On this network, a school can be sited on a small, relatively calm, and safe street and still have high levels of connectivity, such is the case at Highland Elementary (Figure 5.08).

Figure 7.08: 0.25-mile grid street network, Billings and Missoula, MT

This quarter-mile grid should be flexible in application, deviating no more than 200 feet to either side when possible, allowing for exceptions according to topography or to connect with existing streets. Diagonal Park Paths should also be secured as either pedestrian-only or combined vehicular rights-of-way when possible. A Heritage Trail runs just south of Ben Steele site and provides a great datum for a Park Path. If implemented, a

quarter-mile through network could yet achieve a high level of connectivity and walkability in the remaining 60% of the Ben Steele School Zone (Figure 5.09).

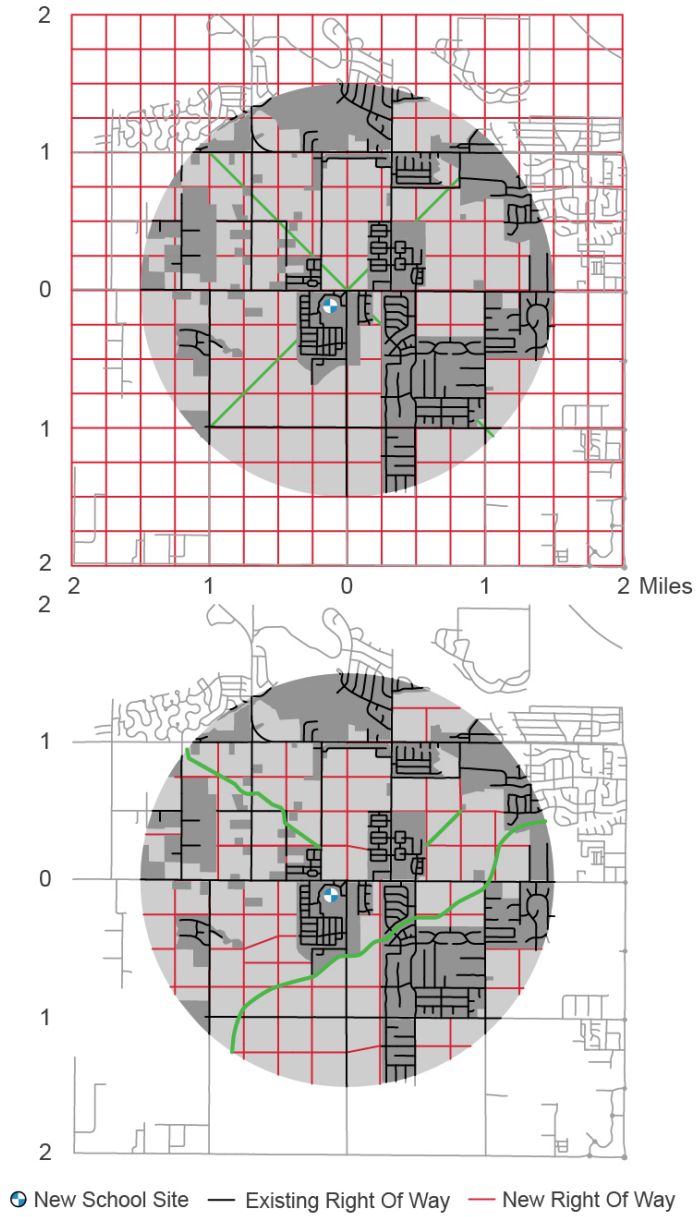


Figure 7.09: 0.25-mile grid street network applied to the Ben Steele School Zone with previously planned Heritage Trail and new Park Paths

To create a city for both adults and children, street sections require some detailed attention. Chapters five and six explored the historical reaction to the dangers posed by automobiles on city streets of separating children from the public space of adults. Those chapters discussed the ways this well-intentioned separation creates suburbs and schools which are isolating for children and families, and ultimately build a city in which only adults capable of driving may move freely about the city. The School Zone seeks to create a city where children can begin to explore their environment, develop autonomy, executive decision-making, and social skills (Lange, 2018). Many, if not all, of the design recommendations in this report would equally benefit adults and senior citizens with varying degrees physical mobility.

Ideally, a new school site should be placed at the center of a one-mile-by-one-mile grid cell. This must, of course, be adapted to real-world circumstances when selecting a site, the process for which is detailed in a later section of this chapter. Removing the school site from the dangers of arterial traffic, and the implementation of traffic-calming measures on all streets will be paramount to the effort of creating walkability.

This requires a shift in priorities, if not in the whole city, then at least in the School Zone. The main objective when designing streets must no longer be the expeditious through-put of vehicles, but the safety of all street users. A person struck by a car at 30 mph is about 70% more likely to be killed than a person struck by a car at 25 mph (Schmitt, 2016). Thus three “speed zones” progressively slow traffic as it nears the school site as depicted in figure 7.10. But a speed limit sign alone cannot ensure safe traffic speeds. Chapter five discussed the the means by which contemporary developers control traffic on neighborhood streets; poor network connectivity. Mandatory traffic calming strategies such as curb bulb-outs at intersections, pinch points on longer blocks, narrow lane widths,

and street trees all contribute to a safe and well-connected street network in the School Zone.

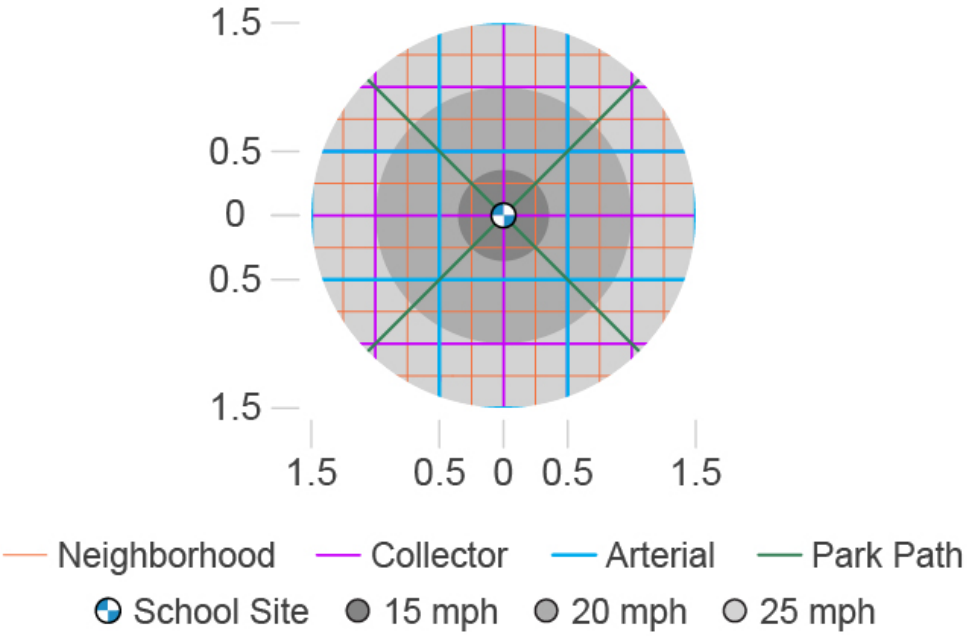


Figure 7.10: Street type locations and speed limit zones within the School Zone

The highest-capacity roadway within the School Zone is the arterial street section. Like the standard arterial section depicted in the Grand Avenue widening at Ben Steele (Figure 3.11), the School Zone arterial exists within a 99-foot right-of-way. Where the standard section has a 15-foot turning lane at its center, the School Zone Arterial features a planted boulevard median and furniture zones at the outer curbs with street trees designed create a sense of enclosure for both motorists and pedestrians. These trees also have the added benefit of slowing traffic and, with the addition of parallel parking lanes, creating a buffer between cars in the street, and the bicycle lane and sidewalk, which are both located up on the curb. At the time of initial construction, street trees may not be financially feasible on all streets, but the existence of furniture zones, or "boulevards" as City of Billings documents refer to them, are part of the "armature for investment" where value can be

added later. These planted zones may also serve as snow storage, allowing sidewalks to remain clear during winter months.

Without the generous center turning lane of the standard arterial section, left-hand turns are restricted to intersections where curb bulb-outs and turning lanes replace parking and the center median. Curb cuts along arterials are discouraged and vehicular access via rear alleys should be used to reduce points of pedestrian-vehicle conflict. Relatively narrow, 10-foot lanes calm traffic to desired speed limits of 25 mph or less. The cumulative intention of these design treatments is to create a safe, comfortable, and interesting pedestrian environment by slowing traffic, protecting active transportation users, and creating useful frontage (Figure 5.11).

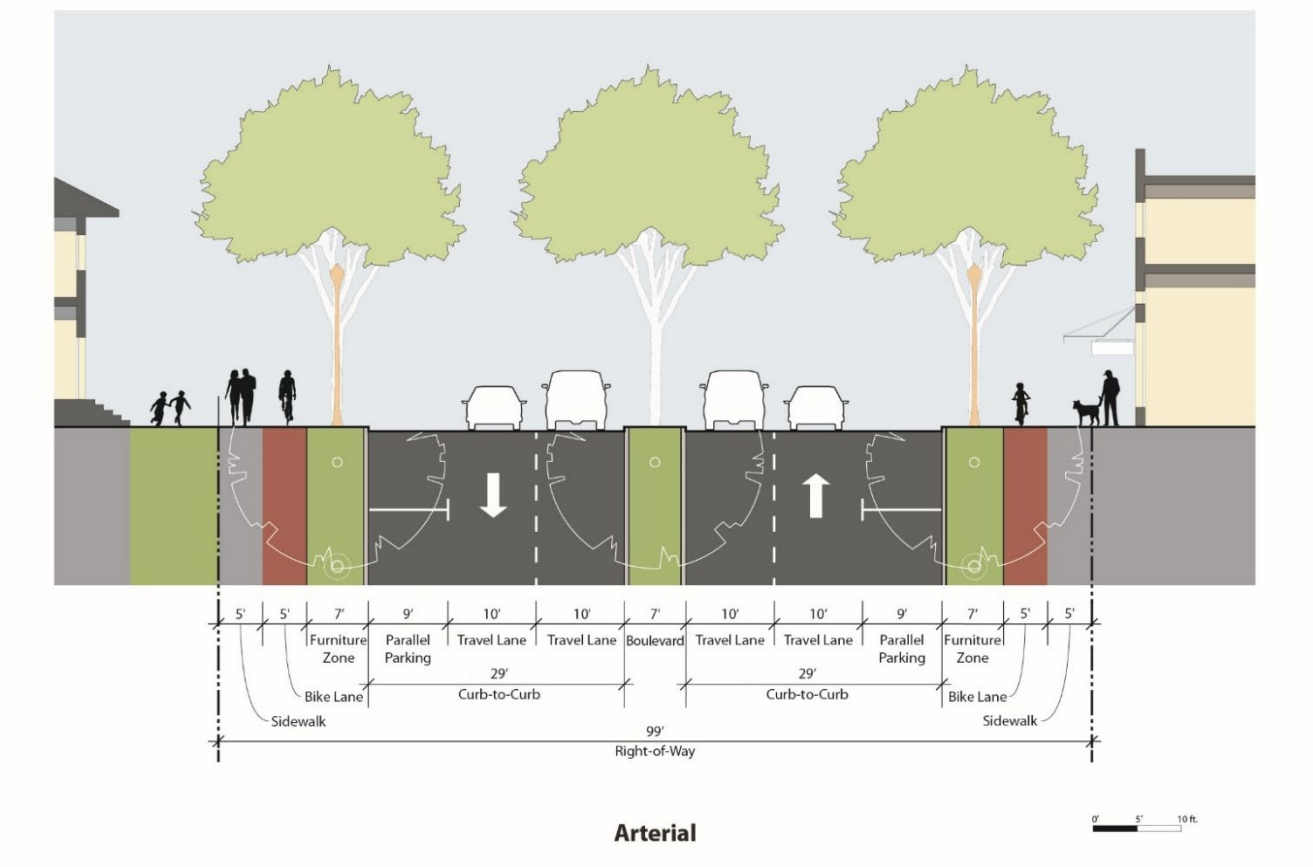


Figure 7.11: School Zone Arterial street section

Collector streets form the half-mile grid of the School Zone (Figure 5.10). Their width of 83 feet makes them nine feet wider than the Billings standard collector right-of-way, but this added width creates space for street trees, protected bicycle lanes, and ample street parking. Ten-foot travel lanes calm traffic where standard lane widths allow higher speeds. This three-lane section also eliminates lane weaving that occurs in four-and-five-lane sections while carrying similar traffic loads as four-lane sections (NACTO, 2013).

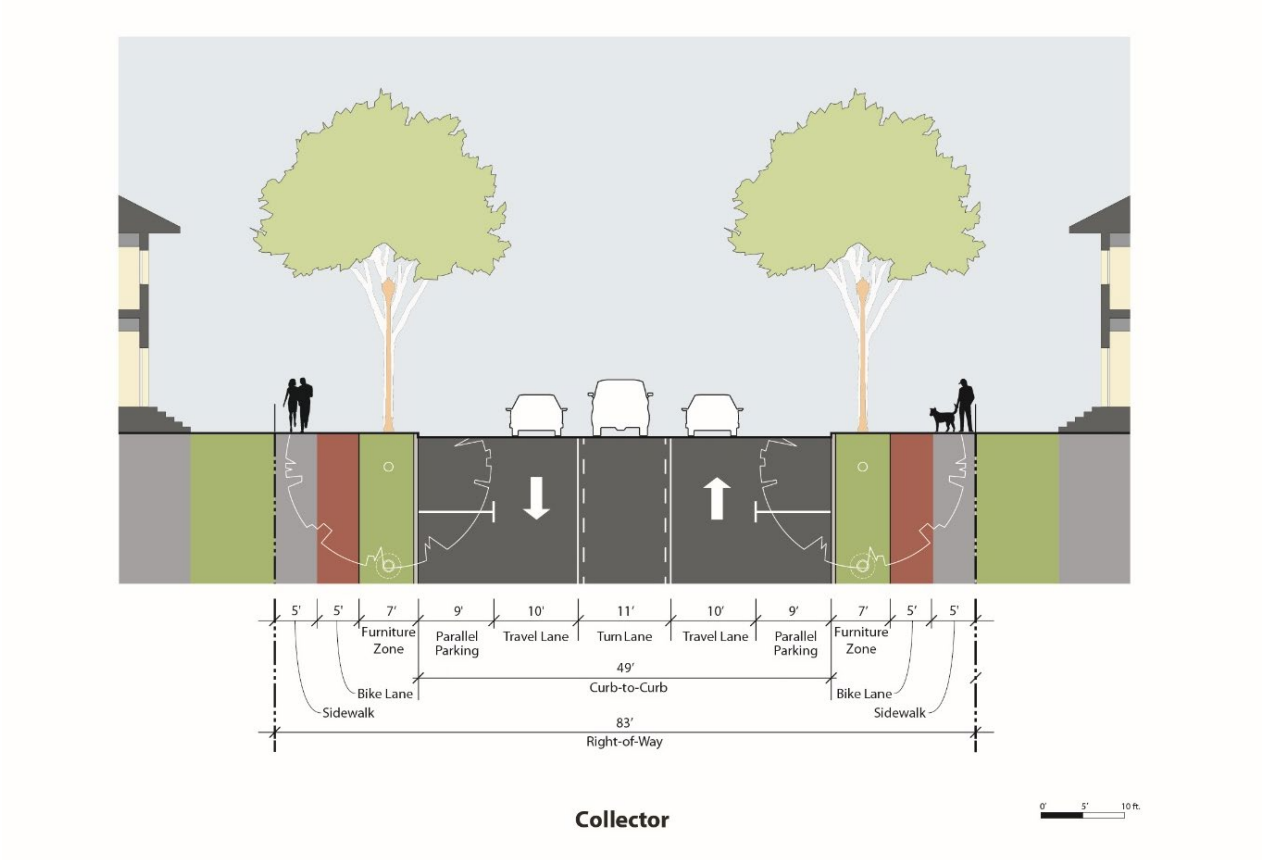


Figure 7.12: School Zone Collector street section

The Neighborhood street type correlates to the Billings Subdivision Regulations' "Residential Local Access Street," which is three feet wider than the 53-foot section I propose here. Figure 5.13 shows the typical section for this street; two travel lanes and one

lane of parking. In commercial areas, neighborhood streets may have parking lanes on both curbs within a 62-foot right-of-way. Two lanes of parking are also possible in a yield-way configuration of the neighborhood street within the same 53-foot right-of-way. Street trees at every 30 feet maximum continue the priorities of pedestrian comfort and traffic calming. These streets are designed to be slow enough as to not require a dedicated bike lane. Most instances of this street will occur within the quarter-mile through-street grid and individual developers will determine their ultimate location.

Figure 7.13: School Zone Neighborhood street section

The “Park Path” right-of-way comes in two flavors; standard and Collector. Because this right-of-way’s purpose is to connect outlying areas to the School and the neighborhood center around it, the Park Path’s standard section does not include vehicular transportation. At 24 feet, its width is that of a typical alley with a mixed-use path replacing a vehicular travel lane (Figure 7.14). A maximum fence height of four feet on properties abutting the Park Path ensures that it will be a safe place with “eyes on the street” where children can move about the city while under the passive surveillance of adjacent households (Jacobs, 1961).

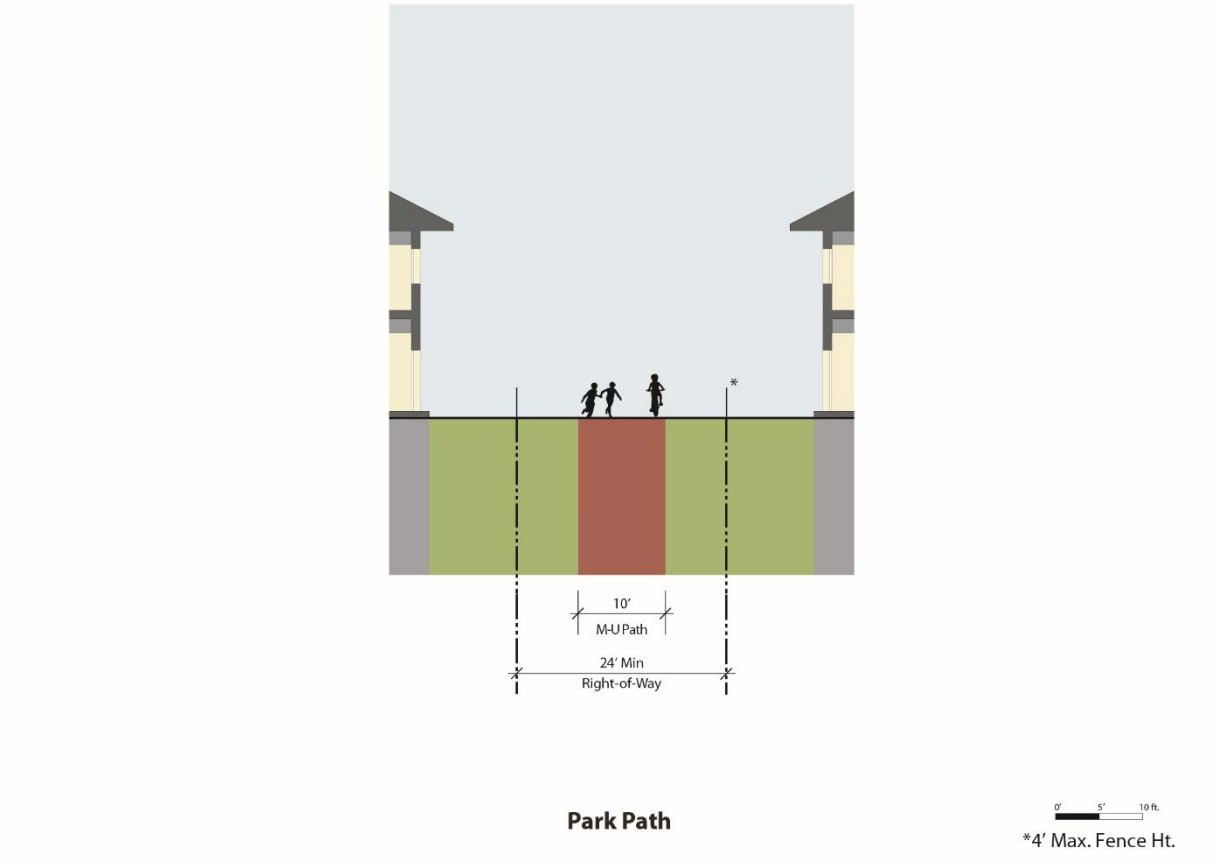


Figure 7.14: School Zone Park Path section

Trails within the aptly-named “Trails West” subdivision do not adhere to this standard, and are closed in, sometimes on both sides, by long stretches of high, vinyl fencing. Thus these trails offer very little visual interest to those that would stroll down them. Without visual lines-of-sight, these trails are safe only by virtue of the sparse population density surrounding them, and may, in time, become nuisances to those properties that abut them (Figure 7.15).

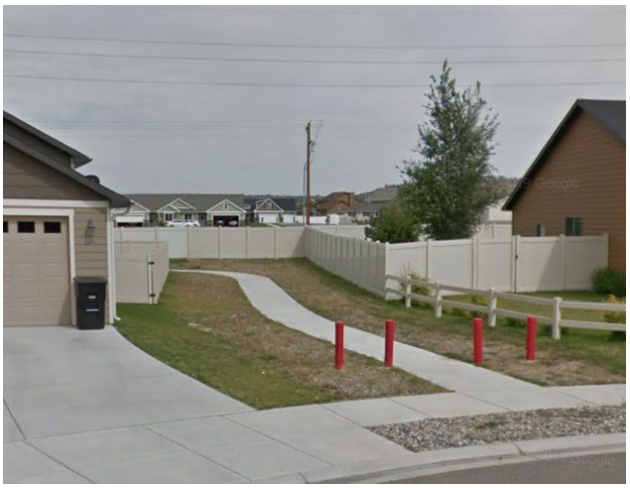


Figure 7.15: High vinyl fencing along trails make for a dull pedestrian experience at the Trails West subdivision near Ben Steele middle school.

The vehicular variation of the Park Path recalls Missoula’s East Pine Street with a generous median and two one-way couplets (Figure 5.16). This “park boulevard” should be 24 feet across at minimum to provide a buffer for path users from traffic.

Figure 7.16: A park boulevard, one-way couplets, and street trees make an enjoyable, safe pedestrian experience on Missoula's East Pine Street.

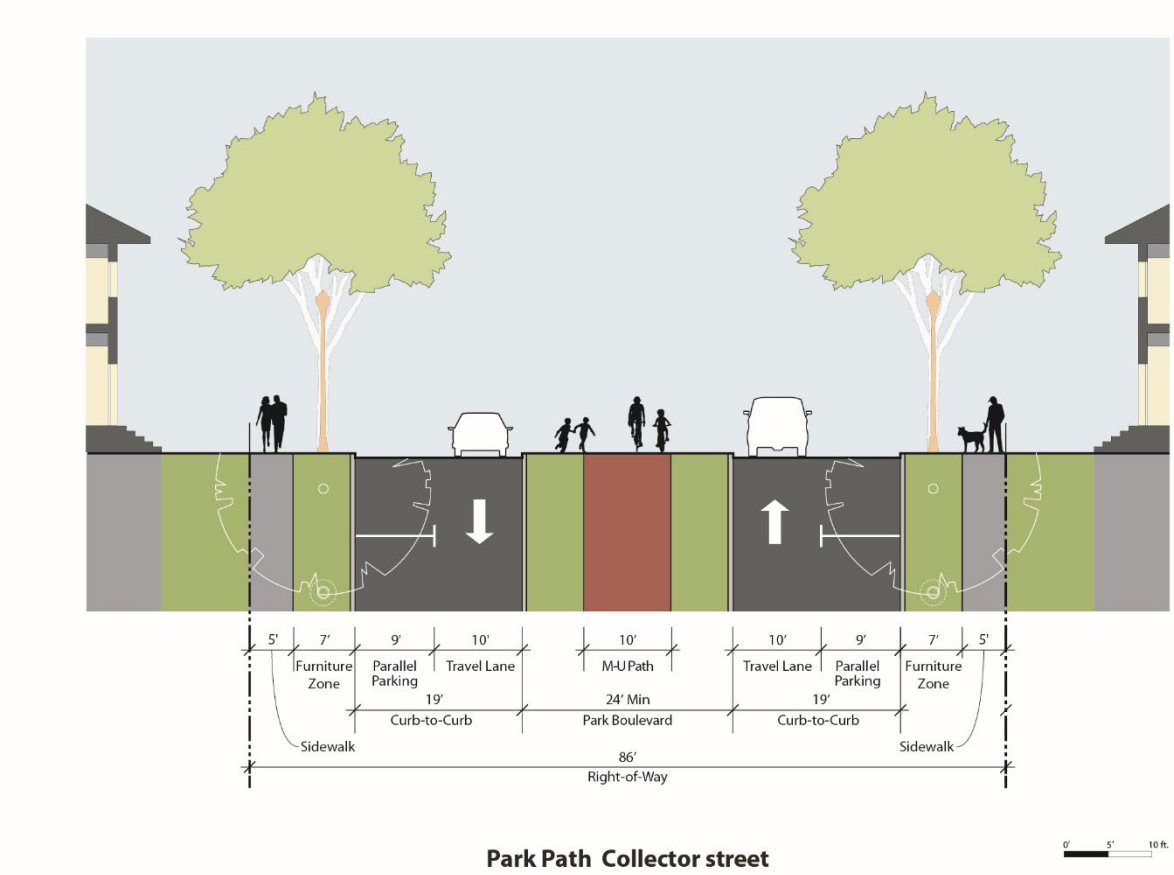


Figure 7.17: A park boulevard, one-way couplets, street trees, and a multi-use path integrate the street for children and adults to safely move about the city.

Century Decisions: Blocks

Within each cell of the quarter-mile grid, an area of about 40 acres, developers will place neighborhood streets as needed to form blocks. The size of these blocks will determine the walkability (Speck, 2018), and the flexibility (Marohn, 2020) of that development for the next hundred years or more.

The little town of Bastrop, Texas, with its population of 9,400 has, in the face of development pressures from neighboring Austin, just 25 miles to the north-west, opted to confine all future development to what it calls the "Bastrop Building Block" (Schroeder et all, 2019). The Bastrop Building Block, or B3, refers to Bastrop's historical structure of 330-foot, square blocks (Figure 7.18).

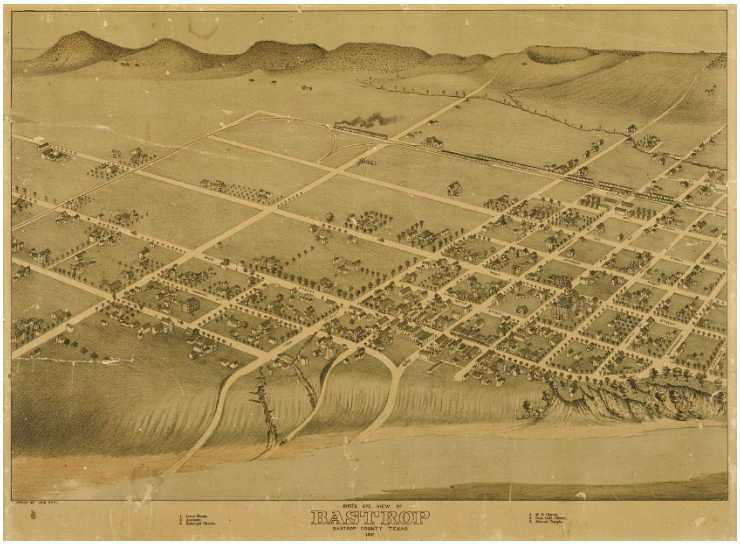


Figure 7.18: Historic Bastrop, TX built on a grid of small blocks. (Schroeder et all, 2019)

Bastrop has adopted the block strategy for several reasons. Appropriately-sized blocks create a walkable street network. Regular blocks are easy to navigate. Grids of

streets adapt easily to different uses over time, allowing those uses to "plug in" to the existing infrastructural armature. The grid has deep historical roots in traditional American city building, and "can accommodate everything from a farm to a skyscraper" (Schroeder et all p5, 2019)

For those reasons, I recommend that developments fill in the quarter-mile street grid with well-defined blocks. As in the Bastrop plan, these blocks may take whatever form the developer desires, with the caveats that they not exceed a maximum perimeter of 1800 feet or a maximum block face length of 600 feet. This allows any number of block shapes and arrangements (Figure 7.19).

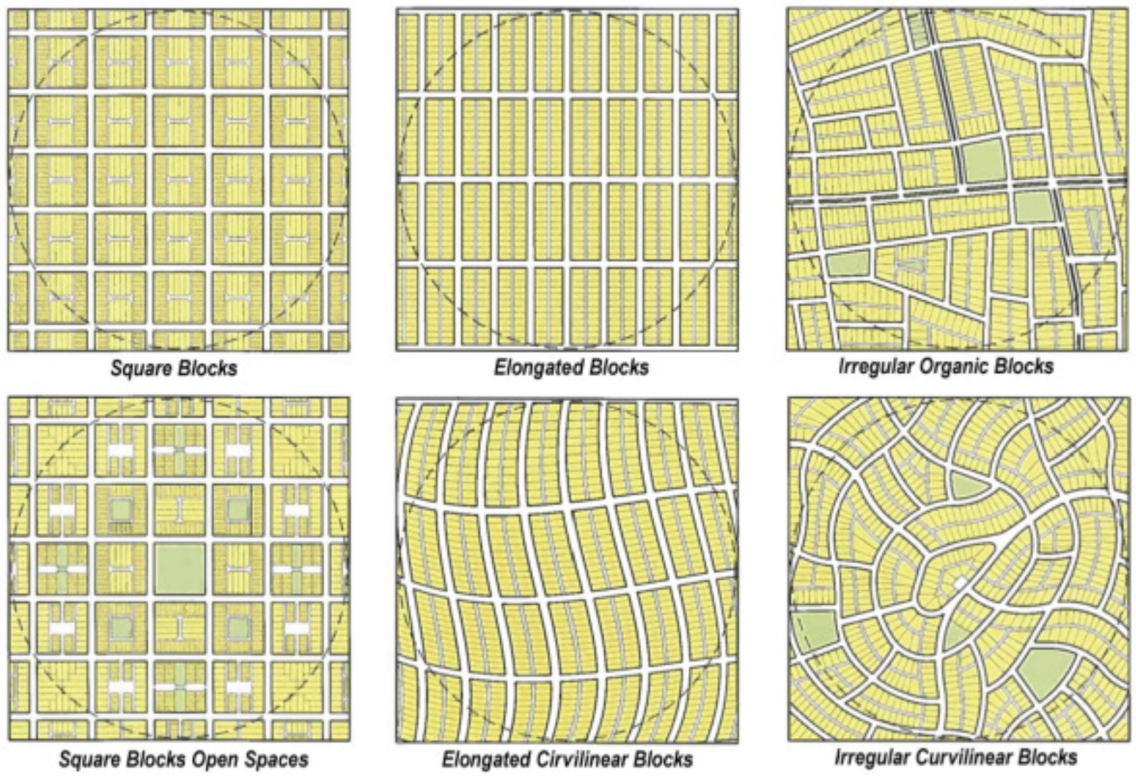


Figure 7.19: A variety of block types are possible within the proposed maximum perimeter and block face requirements.

The historic Billings neighborhood known as “The Tree Streets” features blocks ranging from about 800 feet to 1,700 feet in perimeter. The blocks of historic Missoula have perimeters of about 1,700 feet as well (Figure 7.08). One other common feature among these enduring and well-loved Montana neighborhoods is their alleys. Alleys allow for vehicular access to the backs of parcels, which reduces the length of curb-cut along the street. With fewer curb cuts, street fronts can support more street trees and reduce the instances of pedestrian-vehicular conflict points (Figure 7.20).

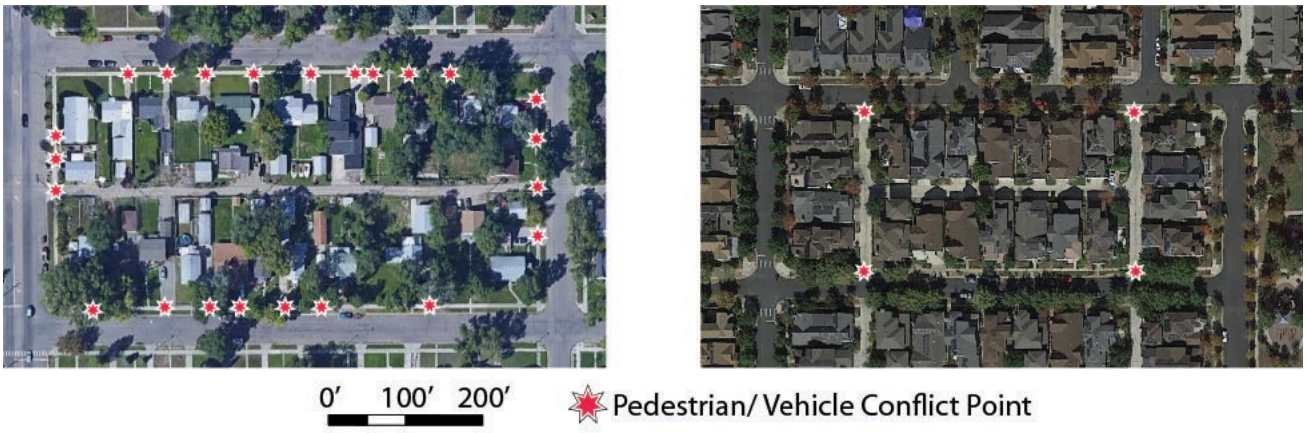


Figure 7.20: Relationship of pedestrian safety to curb cuts, and alley utility in Billings, MT (left), and the Mueller neighborhood of Austin, TX (right).

Alleys on traditional, shorter blocks are much more useful than those on longer blocks. Historically, alleys have served for vehicular access, trash collection and other various “back of house” needs. After World War Two, as cars came to dominate city streets, their garages were moved to the front of homes, and blocks grew longer, making alleys useful only for trash collection. Blocks in Central Heights neighborhood, developed

in the 1950's, have perimeters as high as 3,100 feet (Figure 6.03). In later suburbs, the car become not just dominant, but the only viable mode of transportation available, as sidewalks, rear alleys, and pedestrian rights-of-way disappeared (Duany et all, 2010). From historic, traditional neighborhoods to contemporary subdivisions, the block has stretched and distorted to the point of near disintegration with the use of cul-de-sacs. Blocks in Copper Ridge subdivision in Billings feature perimeters upwards of 4,700 feet. County subdivisions in the Billings area can have blocks with perimeters over 7,400 feet. This trend in suburban development creates a street network with extremely poor connectivity, resulting in the myriad inefficiencies and quality-of-life problems detailed in chapter five.

By limiting the size of blocks in new subdivisions, we create an infrastructural armature for investment, and ensure that today's growth does not become tomorrow's burden. In the case of county development, the 1,800-foot block can accommodate half-acre or larger parcels, equal to those in high market demand today. What a coherent, fine-grained, block structure allows, which does not exist in status quo subdivisions, is temporal flexibility (Figures 7.21, 7.22). As economic or demographic conditions change, smaller, alley-serviced blocks can accommodate changes in density and use that contemporary development cannot. Smaller blocks promote incremental, in-place wealth-building and investment. Rear alleys can be paved when more intense use merits the investment. Where private investment might initially merit only one sidewalk on a street, later investment might merit two. Accessory Dwelling Units can be built to generate additional income. Street trees can be planted to add character and safety. Parcels or structures can be subdivided to allow greater density and ultimately, value. All this is possible because the block, parcels, and street network can handle the additional use. Status quo subdivisions are built frozen in their finished state, inflexible to change of any kind. Small blocks are adaptable, and resilient. Large blocks are rigid, and brittle (Marohn, 2020).

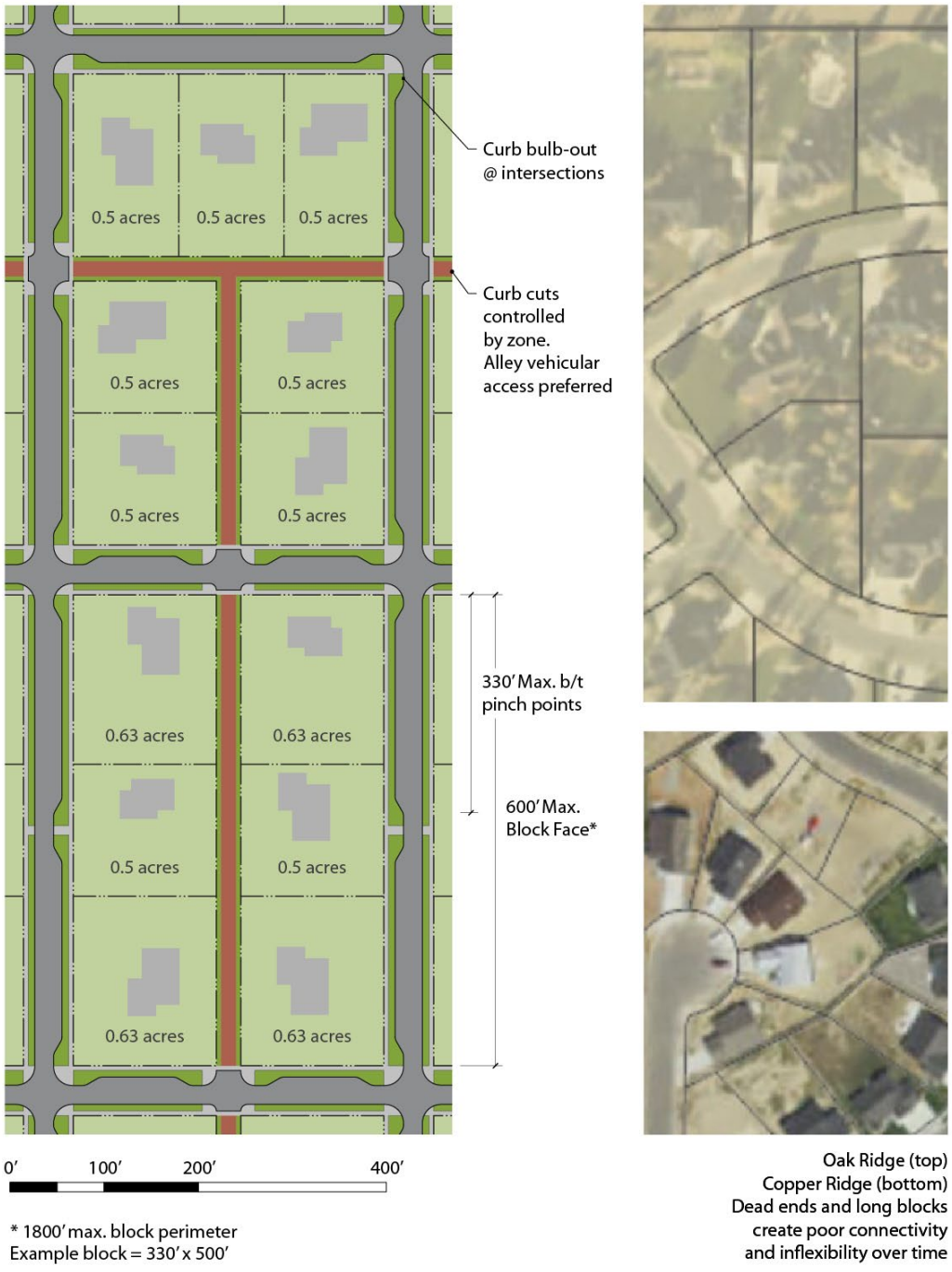


Figure 7.21: Example conforming block accommodates the large parcel sizes sought after in county developments today.

Figure 7.22: The same example conforming block accommodates change.

Century Decisions: Parks Network

In chapter five, I delved into the American Playgrounds Movement's creation of separated spaces for children as a reaction to the dangers posed by vehicular traffic. I also discussed how that separation eventually grew into the age-segregated city many of us live in today. Chapter six studied several planned developments including Columbia, Maryland and Radburn, New Jersey. In both of those case studies, the ideal of the age-segregated city lead designers and developers to create one set of spaces (playgrounds, parks, trails) for children to walk and play, and another set of spaces (streets, roads) for adults to move about the city in cars. Those chapters also discussed how that intersected with the attitude that walking and cycling are recreational, and driving is for making useful trips, to create parks and trail networks that serve only provide circulation internal to a development.

Section 23-1002 of the Billings Subdivision Regulations specifies the percentage of land a developer must dedicate to park land (City of Billings, 2012). It discriminates between developments of differing parcel size as follows:

Section 23-1002. Park Land Dedication Requirements (76-3-621, MCA).

A. Except as provided in Sections 23-1008 and 23-1009, a subdivider shall dedicate to the City a cash or land donation equal to:

1. 11% of the area of the net land proposed to be subdivided into parcels of one-half acre or smaller;
2. 7.5% of the area of the net land proposed to be subdivided into parcels larger than one-half acre and not larger than 1 acre;
3. 5% of the area of the net land proposed to be subdivided into parcels larger than 1 acre and not larger than 3 acres; and
4. 2.5% of the area of the net land proposed to be subdivided into parcels larger than 3 acres and not larger than 5 acres.

Figure 7.23: Billings Subdivision Regulations park land dedication requirements

In doing so, these regulations may incentivize low-density development. For this reason, development within the School Zone must dedicate park land at the 11% rate

regardless of parcel size. In addition to a flat park land dedication requirement, cash donations should not be accepted in lieu of land dedication, although development rights transfers may be allowed within the School Zone to ensure equal net creation of park land.

Policy dictating the percentage of park land alone is not enough to create walkability at the district or city level. City staff should pursue park land dedications that create links in an active transportation network through developments and subdivisions. The "Park Paths" shown in figures including figures 7.05 and 7.10 are examples of the types of network connections that the city should seek to create throughout the city. Figure 7.25 of this chapter shows, diagrammatically, how trail systems can connect a network of parks with a school at its center.

The city of Austin, Texas has recently undertaken to build networks of trails and parks throughout the city. One example is the "Waterloo Greenway" currently under construction by the Waller Creek Conservancy (Rambin, 2019). The greenway rehabilitates Waller Creek in downtown Austin to serve as a trail linking an array of parks and public spaces (Figure 7.24). Austin has implemented similar projects along several other creeks that run through town, some of which are simple, urban trails, and others that serve as well-used bicycle commuter routes to and from the central business district.

Montana cities should pursue trail and park networks that build on the armature of natural features like creeks, ridge lines or overlooks, or man-made features like irrigation ditches. Networks of streets, trails, parks and paths that support safe, active transportation for useful trips are key to increasing active commuting and attracting skilled workers and employers to Montana who value an active lifestyle (Myers, 2016).

Figure 7.24: The Waller Creek Trail in Austin, TX connects park and public spaces to create a link in the city's active transportation network

SECTION 02: USE ZONES

Within the larger, 1.5-mile radius School Zone, where the requirements of section one of this chapter apply equally, are four use zones. The actual land area of all but the "School Zone Core" use zone will vary depending upon local market conditions. Figure 7.10, in section one of this chapter, depicts three speed zones that govern the speed of motor vehicles in the School Zone. The use zone areas in figure 7.25 correlate to those speed zones.

The following use zone diagrams represent an ideal. A School Zone located in a county might develop entirely at densities of 0.75 units per acre and fill out (by virtue of the controlled block size) to the intensity of use listed in this chapter over the course of several decades. Within city limits and where feasible, achieving the intensity of use proscribed will yield the greatest benefits, and the creation of a viable neighborhood center anywhere will require a preponderance of destinations as to reap agglomeration economies.

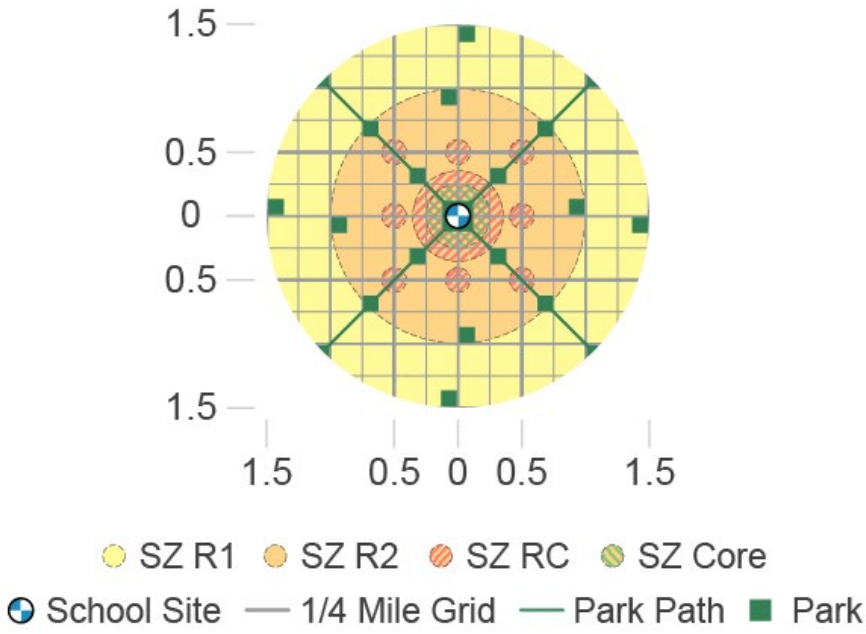
In keeping with the "armature for investment" aspects of the School Zone, each use zone prescribes minimum and maximum densities. Required elements like street trees and sidewalks may also be built out over time, depending on the zone.

Of note in figure 7.25 is the absence of any single-family use zone. The lowest limit on the number of units allowed in a single structure is a four-plex. Single-family, exclusionary zoning is wide-spread in America, and is well-known as a tool of economic and racial segregation (Kahlenberg, 2019), it is therefore not included in this proposal.

Although lot width maximums begin to control the scale of future development, application of the School Zone concept and its use zones would require further development of form-based restrictions including height, bulk, setbacks and active frontage requirements in commercial areas. Within structures conforming to those restrictions, it is no business of the government, nor anyone else, to prohibit four households from each occupying a residence of 500 square feet where one household might otherwise occupy a residence of 2000 square feet.

SZ R1: School Zone Residential (Periphery)

Residential areas in the outermost ring of the School Zone will most closely resemble typical suburban development occurring within city limits today. City development in the Ben Steele area analyzed in chapter three of this report (Figure 3.17) showed a gross residential density of 2.88 units per acre. The minimum gross residential density in the School Zone periphery should be no lower than three units per acre. A range of allowable densities and inclusion of various housing types ensures a sustainable tax base (pursuant to in-depth cost analysis by local jurisdictions), reasonably steady student populations (Larco, 2010), and the ability to adapt to unforeseeable circumstances in the future without the barrier of excessive red tape.



Zone	SZ R1	SZ R2	SZ RC	SZ C
	School Zone Residential (Periphery)	School Zone Residential (First-Ring)	School Zone Residential/ Commercial Entitled (NH Center)	School Zone Core
Min Gross Units/ Acre	3	6	6	6
Max Gross Units/ Acre	6	12	12	12
Max Units/ Building	4	6	none	none
Max Height (feet/stories)	30'/ 2	30'/2	40'/3	40'/3
Prohibited Uses	Commercial Office Industrial	Commercial Office Industrial	Industrial	Industrial
Min Lot Width	20'	20'	20'	20'
Max Lot Width	100'	50'	R:50' C:100'	R:50' C:100'
Curb Cuts per Block Face (count/ linear feet)	2/ 24'	2/ 24'	2/ 36'	2/ 36'
Parking Location	Rear or side of Building	Rear or side of Building	Rear or side of Building	Rear of Building
Street Trees (max distance)				
Yr 1	n/a	60'	60'	30'
Yr 10	60'	30'	30'	30'
Yr 20	30'	30'	30'	30'
Sidewalks (per street)				
Yr 1	1	2	2	2
Yr 10	1.5	2	2	2
Yr 20	2	2	2	2

Figure 7.25: Land use zones within the School Zone

SZ R2: School Zone Residential (First Ring)

The inner ring of residential use should build out to include subdivisions and multi-family developments at densities that are, in aggregate, as dense as the local market can support. This level of intensity will produce optimum tax base, private sector value, and student population, as detailed in the Josephine Crossing case study of chapter six. Subdivisions within one mile of the school facility at center are almost guaranteed to be within a 1.5-mile walking distance, so increasing the number of students in this area is paramount to fostering high levels of active school commuting. Low density housing in this zone would represent a missed opportunity to reduce car trips and create a viable neighborhood center.

SZ RC: School Zone Residential/ Commercial Entitled (Neighborhood Center)

This use zone superimposes the entitled uses of commercial and office onto the SZ R2 zone. A mix of commercial and other non-residential uses are vital to a school district's tax base as they contribute to tax base but do not vote on bonds or levies. In interviews, Elder Grove District's Superintendent, Nathan Schmitz, spoke with admiration about Elysian school district's commercial land use mix, and Greg McCall cited it as a boon to Elysian's finances, which in turn make his subdivisions more attractive to young families.

Uses that will necessitate large trucks or that are otherwise detrimental to pedestrian safety should be located in secondary commercial centers away from the school as deemed appropriate.

Certain uses like bars and casinos will, by statute, be required to site a distance from the School site, but should not be so distant as to preclude the creation of a single, cohesive neighborhood center with daytime and evening destinations such as restaurants (Myers, 2016).

SZ C: School Zone Core

This 125-acre area at the center of the School Zone is the only use zone whose boundaries are not diagrammatic and flexible, but are literal and fixed. The 0.25-mile radius of this zone represents the distance that a person can walk in five minutes (Speck, 2018). As with the SZ RC use zone, the School Zone Core adds specific regulations to the underlying use zones. The same uses are entitled in the School Zone Core as in School Zone Commercial, but with added pedestrian safety measures, by reason of its proximity to the school facility at center.

Where all other zones allow parking to the side or rear of a structure, for example, parking must be at rear of a building in the Core use zone. Street trees in other use zones may fill out over time, but in the Core, they must be planted at the time of initial occupancy to slow traffic and ensure pedestrian safety near the school.

SECTION 03: SCHOOL SITE STRATEGY

Earlier chapters of this report have detailed the negative outcomes associated with contemporary site acquisition practices. This section provides an alternative process by which those outcomes can be avoided. The recommendations included herein represent an ideal that will yield the greatest benefits possible. If a school zone cannot be created around a school, many of the recommendations can still apply. Proposals for development of existing sites are included later in this chapter.

Site Relationship to Rights-of-Way

The primary goal of this section is to move school sites away from the dangers of arterial traffic. As discussed in earlier chapters, the one-mile, Jeffersonian grid requires that schools be sited on arterials to have good connectivity. The only way that future school sites will have adequate connectivity and be protected from dangerous arterials is to create through street connections within the one-mile grid, ultimately creating a network of a finer grain than the existing one-mile grid, whose weaknesses were also discussed in depth in chapter five. The following steps are shown in progression from the minimum requirements for student safety and access to the ideal. School districts should progress as far into the requirements as is feasible.

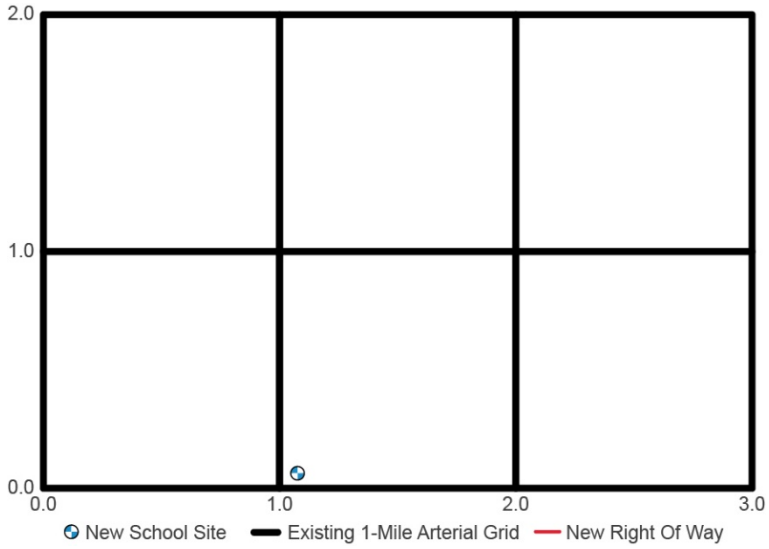


Figure 7.26: The problem: A one-mile grid forces districts to site new facilities on dangerous arterials to achieve adequate connectivity

If a school district can work with city or county boards to dedicate rights of way within the one-mile grid, school sites can begin to move away from dangerous, high speed traffic, toward the interior of those mega-blocks, while maintaining a minimum of connectivity. To achieve such connectivity, I recommend a minimum of two new rights of way to service new school sites (Figure 7.27). This recommendation is based on comments from City of Bozeman Community Development Manager, Chris Saunders, who, during our interview, mentioned that poor connectivity (one right-of-way) at Morning Star Elementary has caused congestion issues for bus and parent drop-off as well as emergency vehicle access concerns (Figure 7.28).

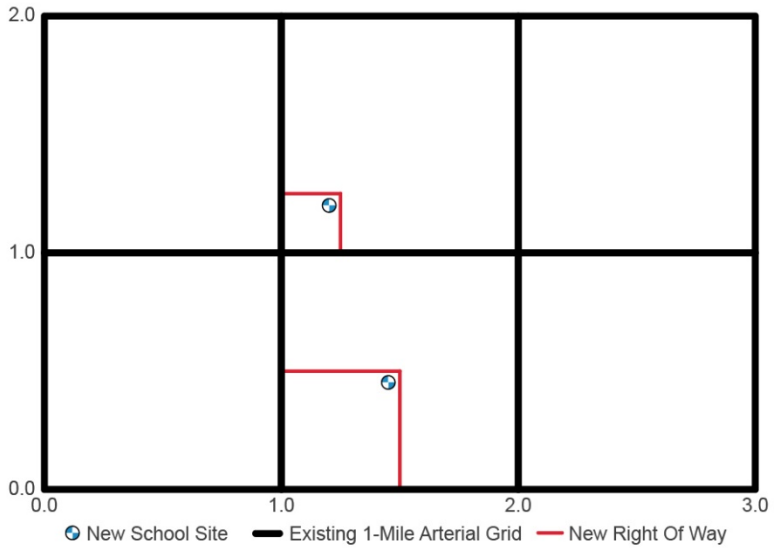


Figure 7.27: Two rights of way provide a minimum of connectivity for school sites to safely distance from arterials. Alternative rights of way shown at one-quarter mile and one-half mile.

Figure 7.28: At Morning Star Elementary in Bozeman, a single right of way provides poor connectivity

Whenever possible, complete through connections should be dedicated to increase the number of students within the school's walk zone. Traffic calming strategies should also be deployed on these streets to ensure safety

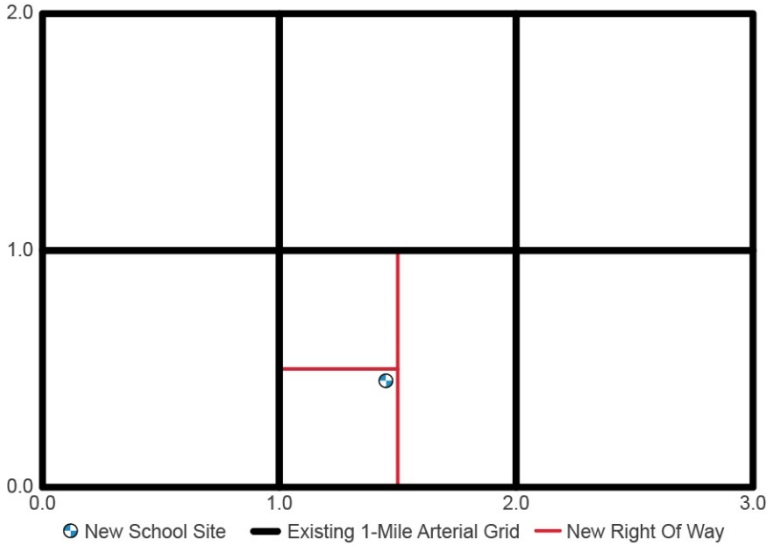


Figure 7.29: Complete through streets grow a school's walk zone and provide safe routes to school.

Beyond the school district's primary objective of acquiring a site that is safely distant from the hazard of arterials, through street connections increase the ability of a school and its surroundings to develop into a viable neighborhood center.

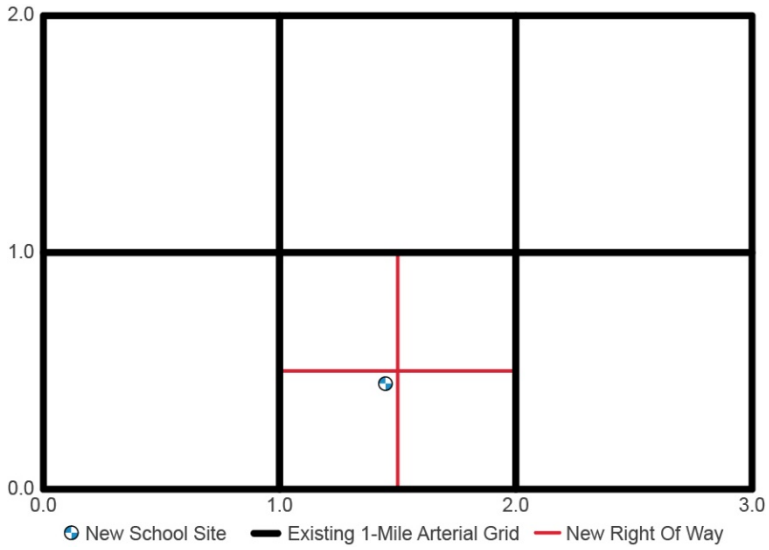


Figure 7.30: Complete through streets improve the likelihood that a school site can develop into a neighborhood center.

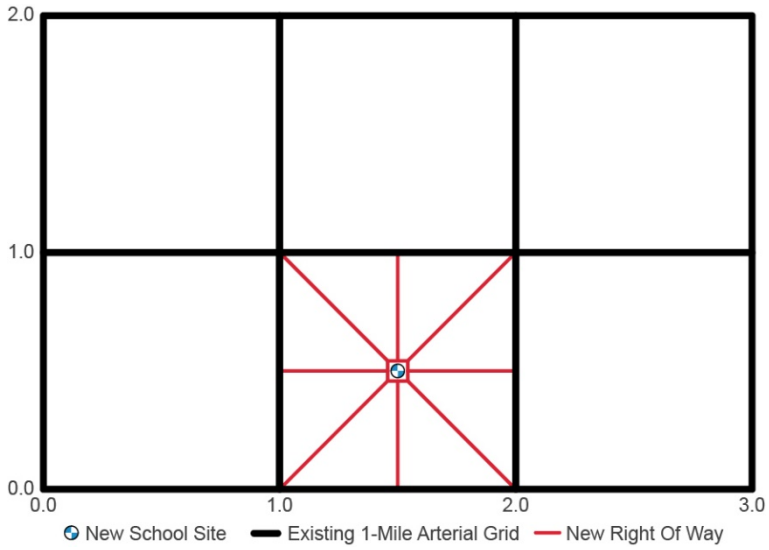


Figure 7.31: Ideal connectivity includes diagonal (ordinal) rights of way

Ideally, not only would a new school site have right of way connections in the cardinal directions, but in ordinal directions as well (Figure 7.31). These diagonal rights of way could be as little as a footpath (Figure 7.14) or as large as a boulevard (Figure 7.16), depending on context. Park paths yield significant service area coverage/ walk zone ratio increases (Figure 7.07). The goal is to create a viable neighborhood center with a school at its heart that as many children as possible can walk to.

Site Acreage and Organization

The second convention of status quo site acquisition that must change is the overly-large acreage of the sites districts are acquiring. Smaller sites will allow districts to locate new facilities closer to existing development, reducing initial development costs, as well as long-term bussing and operation expenses. Ben Steele middle school's site is 35 acres. Gallatin high school in Bozeman sits on a sprawling site of over 50 acres, and, with an adjacent elementary school, occupies over 80 acres on two blocks. Chapter three traced the cause of these huge sites to the demand for collocated athletic fields that allow adults to combine car trips. Bringing school sites and parks together is an old, and valid, pursuit. That pursuit can be problematic when it leads districts to create "big box" schools that concentrate recreational spaces to the extent that they require cars to access. Such large sites also contribute to the dendritic thoroughfare system and all its deleterious effects on pedestrian safety and fiscal sustainability. I suggest that, rather than acquiring a single site of such great size, a district should locate a cluster of smaller parcels including a primary, "school block" that hosts the school building and some ancillary uses, and a number of satellite parcels within 0.25 miles of that block for athletic facilities.

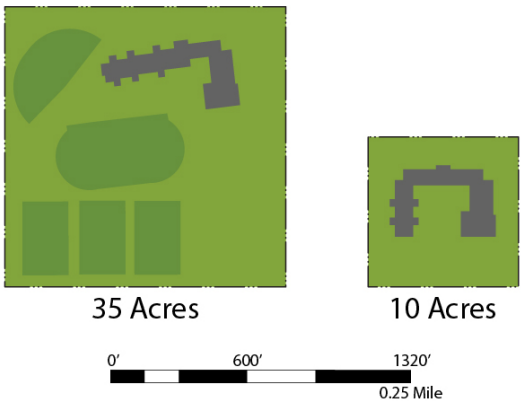


Figure 7.32: Ben Steele middle school's site acreage compared to the recommended maximum School Block acreage

Modelled after the Texas Courthouse Square block type, the "School Block" hosts the school building, as little parking as possible, and any outdoor space that typical recess and lunch activities require. As the centerpiece of the School Zone, the block's position allows it to terminate the vistas of the Collectors and Park Paths that lead to it (Figure 7.33). This elevates the importance of the school as a landmark in the city and as an institution in our society (Veselka and Foote, 2000). Therefore, the school building should be two or more stories in height and have an architectural feature that is significantly taller than any surrounding building.

Figure 7.33: A Harrisonburg square type in Marfa, TX makes the Courthouse a clear landmark

Elementary schools requiring smaller sites might use the Harrisonburg Square type like the courthouse that sits on a two-acre block in Marfa, Texas (Figure 7.33). Middle schools and high schools can site on a larger Four-block Square type (Figure 7.34).

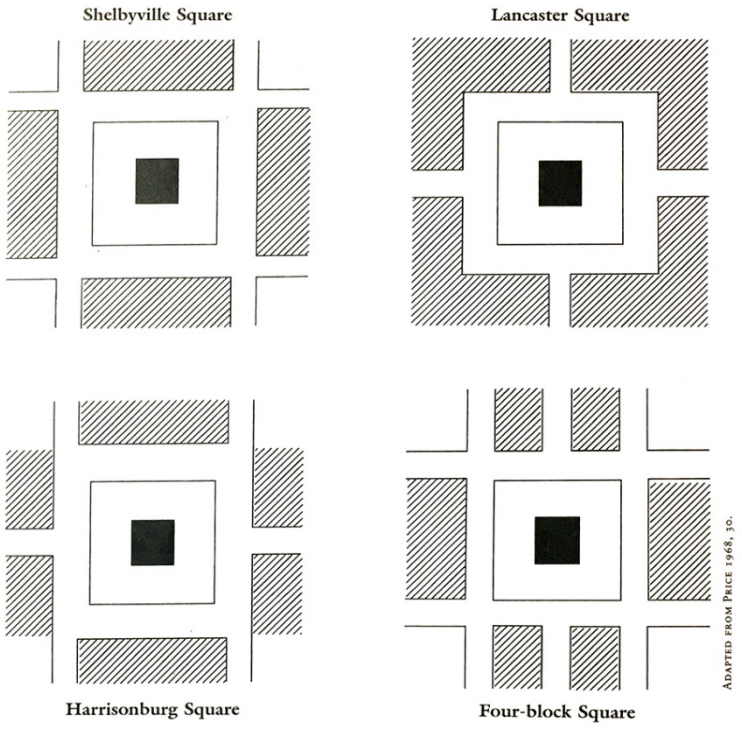


Figure 7.34: Texas Courthouse Square types (Veselka and Foote, 2000)

Moving athletic fields to satellite park increases the amount of park-front property and creates added value to private homebuilders beyond the existing benefit of proximity to a new school facility. Because the school block and satellite parks abut rights-of-way rather than the rear yards of homes, as they do at Ben Steele, public access to these facilities is greatly improved. This configuration also allows the attendant square footage of event parking for those fields to locate on their parcels rather than in one large parking lot on the

school block. By imposing a maximum acreage standard for the School Block, it and the athletic satellite parks can integrate into the structure of a city street grid more cohesively.

The “School Zone Core” use zone detailed earlier in this chapter represents the area in which a district should acquire satellite facilities. Athletic fields within 0.25 miles of the primary school site can be reached by students for physical education classes and after school athletic activities in an easy, five-minute walk. This strategy toward acquisition of athletic facilities has the added benefit of creating value in the form of park-front property (Figures 7.35 and 7.36).

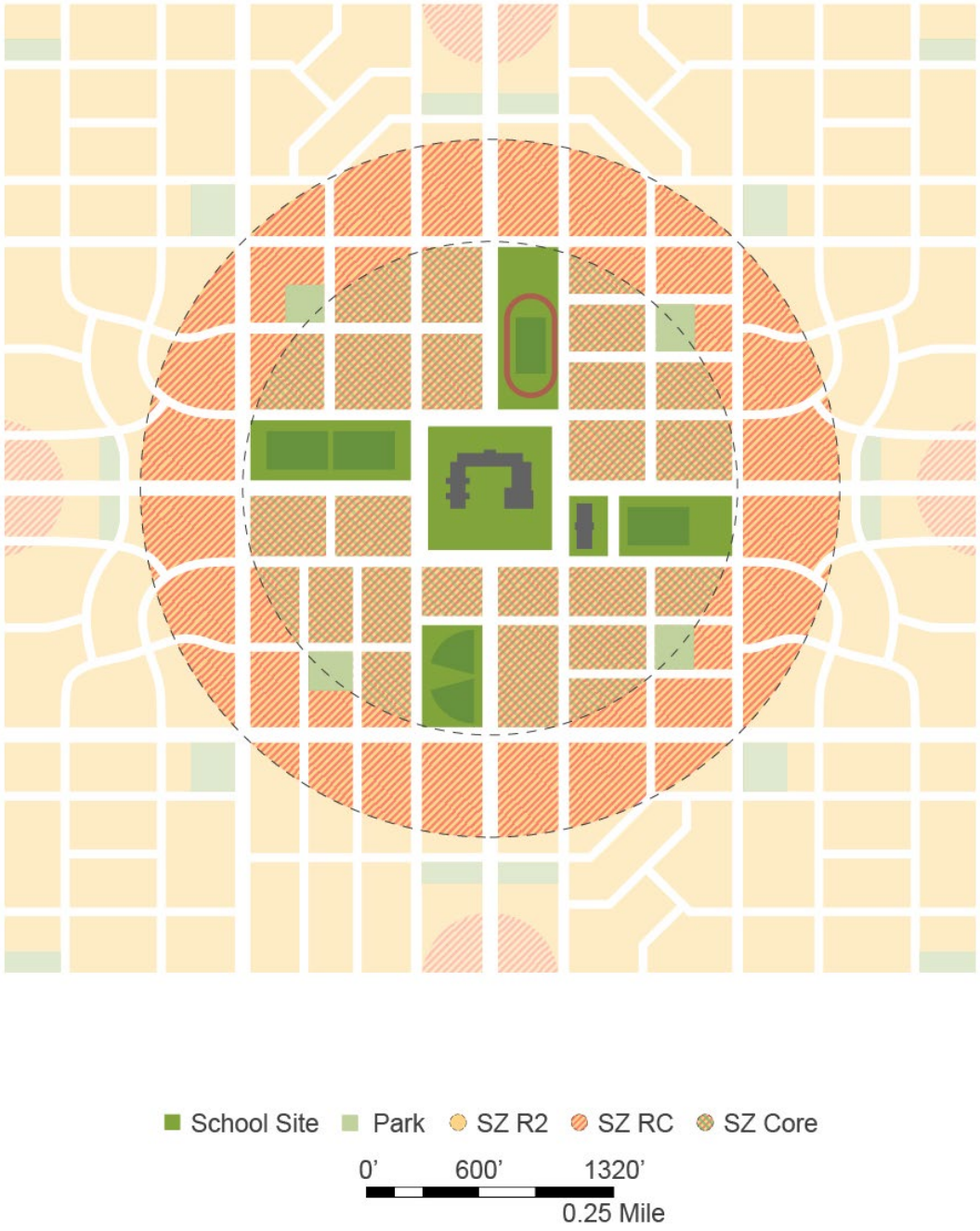


Figure 7.35: A school block of 10 acres and satellite facilities of 23 acres host the same program as Ben Steele while creating a cohesive neighborhood center and park-front property in a School Zone without diagonal Park Paths

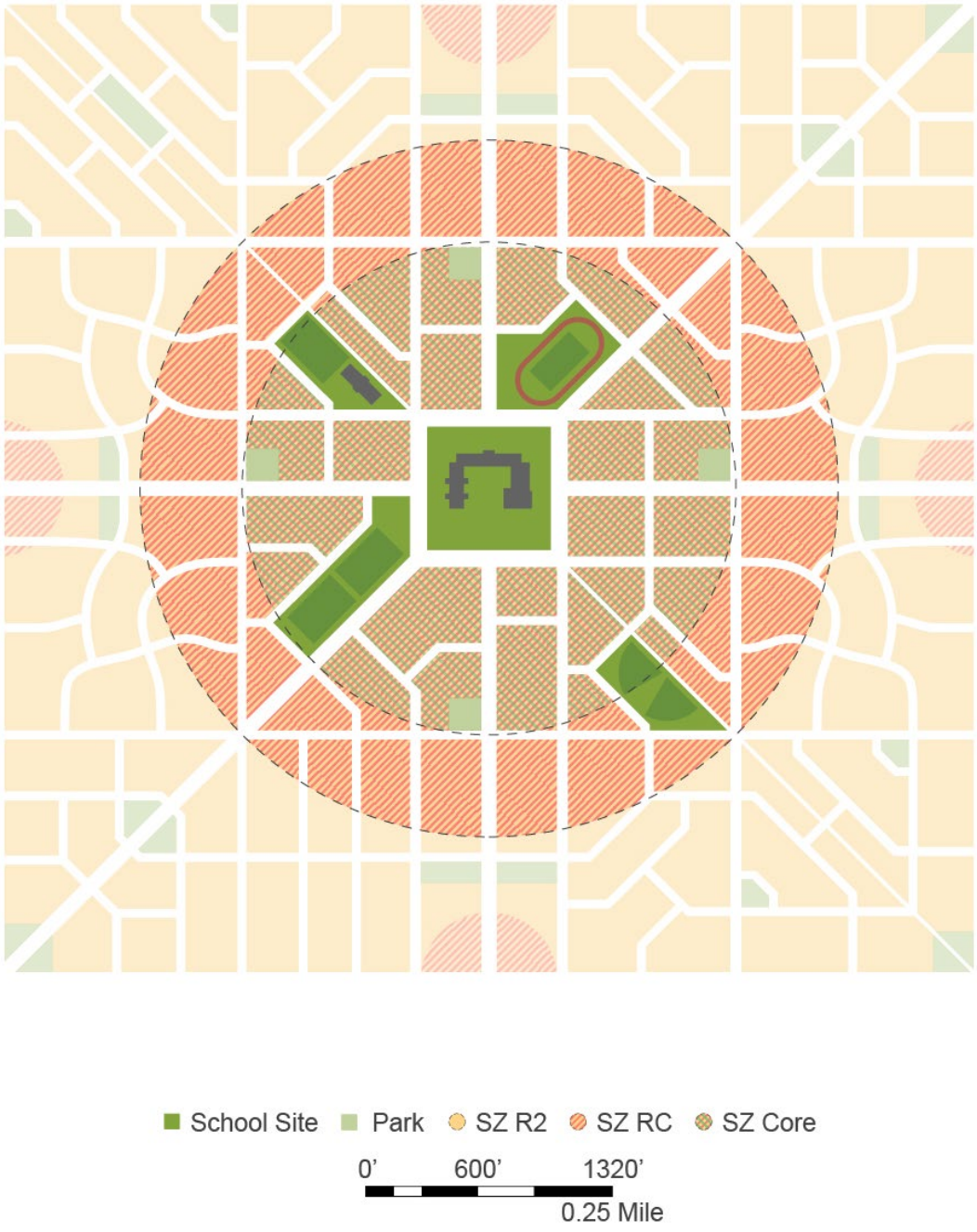


Figure 7.36: A school block of 10 acres and satellite facilities of 18 acres host the same program as Ben Steele while creating a cohesive neighborhood center and park-front property in a School Zone with diagonal Park Paths

Under normal circumstances it would be anathema to students' safety to require them to cross a street to access an athletic field, but safety measures in the School Zone make a neighborhood center where children cross streets on a regular basis very reasonable. The 0.25-mile radius "School Zone Core" sits completely within the 15-mph speed limit zone shown in figure 7.10. Street trees and narrow lane widths on all streets in the School Zone also contribute to an environment where children can safely walk and play in public. Block lengths limited to 330' for any block facing a school site and required curb bulb-outs and signalized crossings at intersections will have added traffic calming effects. "Barnes Dance" signalization at school site corner intersections will provided even greater levels of pedestrian safety where heavy and frequent pedestrian traffic is anticipated.

Diagonal, back-in parking within the right-of-way surrounding the school site spreads parking around the block, and frees up acreage on site for higher use. In this way, a school site block with 660' faces can support up to 128 parking spaces, not accounting for any necessary service vehicle curb cuts. These parking spaces can also flex before and after school or during special events to serve as pick-up and drop-off space for both parents and busses. Curb cuts for vehicular access to parcels facing the school block should be relegated to side streets to minimize pedestrian-vehicular conflict around the school and create a consistent street wall (Figure 7.37).

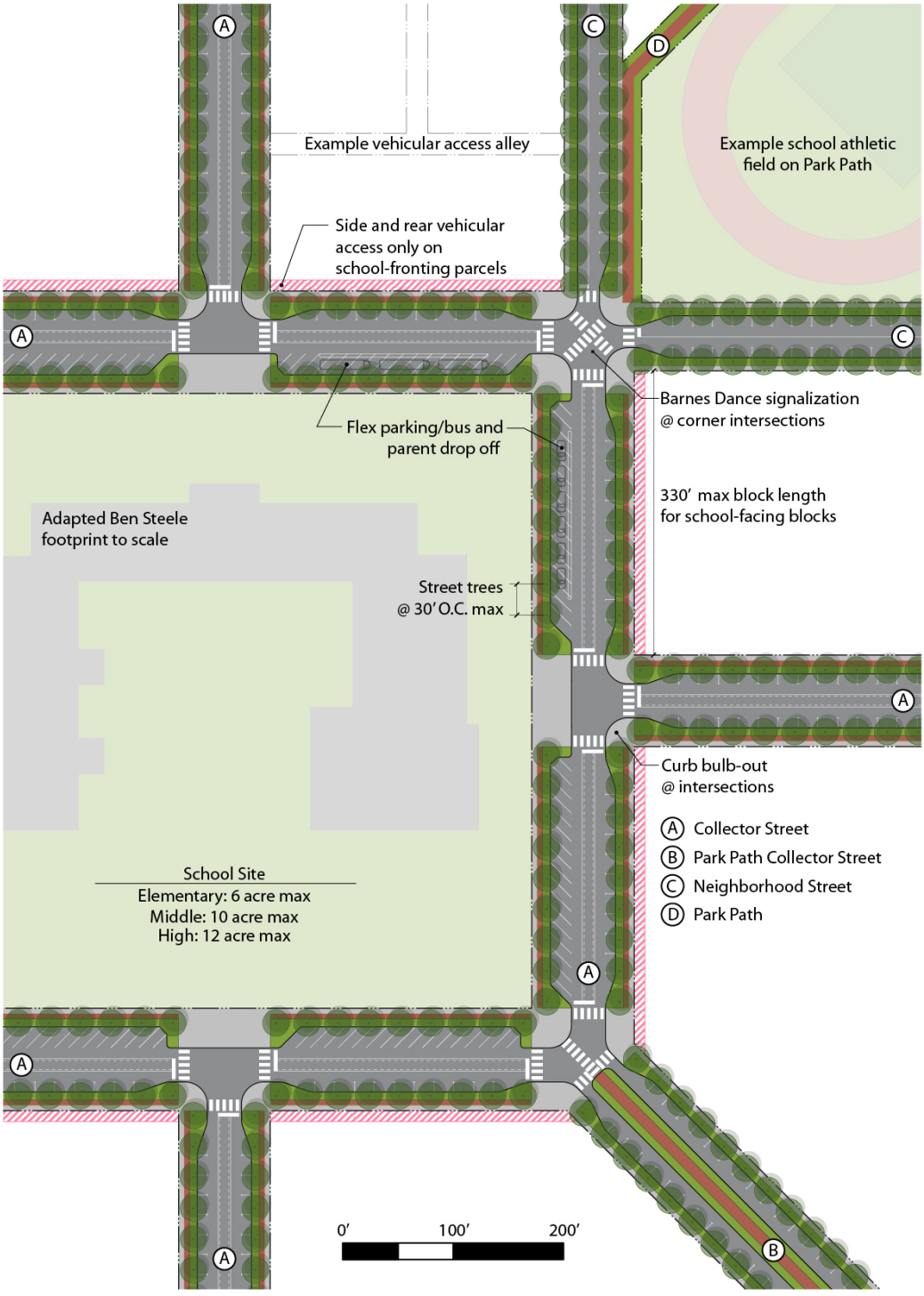


Figure 7.37: A school block and safe streets for all at the center of the School Zone

Strategies for Existing Sites

In cases where districts have already acquired sites in anticipation of future facilities, school sites should be developed to provide as much adaptability and value as possible. The safety and education of students is, of course, first priority in the design of any school facility, but, as is true with any real estate investment of such size and import, the option to expand must also be considered.

Both Ben Steele and Elder Grove middle schools sit at the intersection of two arterials. For similarly-situated parcels, the nuisance of those arterials will dictate much of the layout of the site. By setting the school building back from those arterials by at least 250 feet, noise and particulate can be mitigated, and the option to develop a buffer of commercial properties maintained. All on-site parking and vehicular circulation should be sited within this commercial buffer. Similarly, the option to build an added layer of residential development along the interior lot line exists if the community's recreational needs ever change at that location. Though most sites will not be large enough to accommodate options to expand commercial, residential, and civic uses, proper configuration should include some options to expand, given the uncertainty and volatility of our times.

A perimeter road built centered on the interior lot lines of the site, coupled with a requirement that adjacent development front onto that road, creates private sector value in the form of park-front real estate. McCall homes charges premiums of up to 30% on their park-front parcels. Additional benefits of the interior lot line road include increased public access to the school's recreational facilities, and reduced congestion at the arterial intersection. This road should include traffic-calming features to ensure low traffic speeds (Figure 7.38). At Bozeman Gallatin high school, perimeter roads were built in the same way; the school district paying for its half to the property line, and private developers

paying to construct their half. Where development has not yet occurred, schools may build this road and recoup expenses from later development in fees.

Limits on the length of blocks facing the school block and traffic signals at intersections will slow traffic, which is good for pedestrian safety and commercial real estate value. Pedestrian connections in the form of Park Paths and trails will enhance pedestrian connectivity if their dedication is possible.

Although it may be years, before the option to expand uses on a school site is seriously considered, it offers the school district a degree of long-term adaptability that may prove invaluable at a later date. In the “infinite game” of city building, the value of adaptability should not be underestimated.

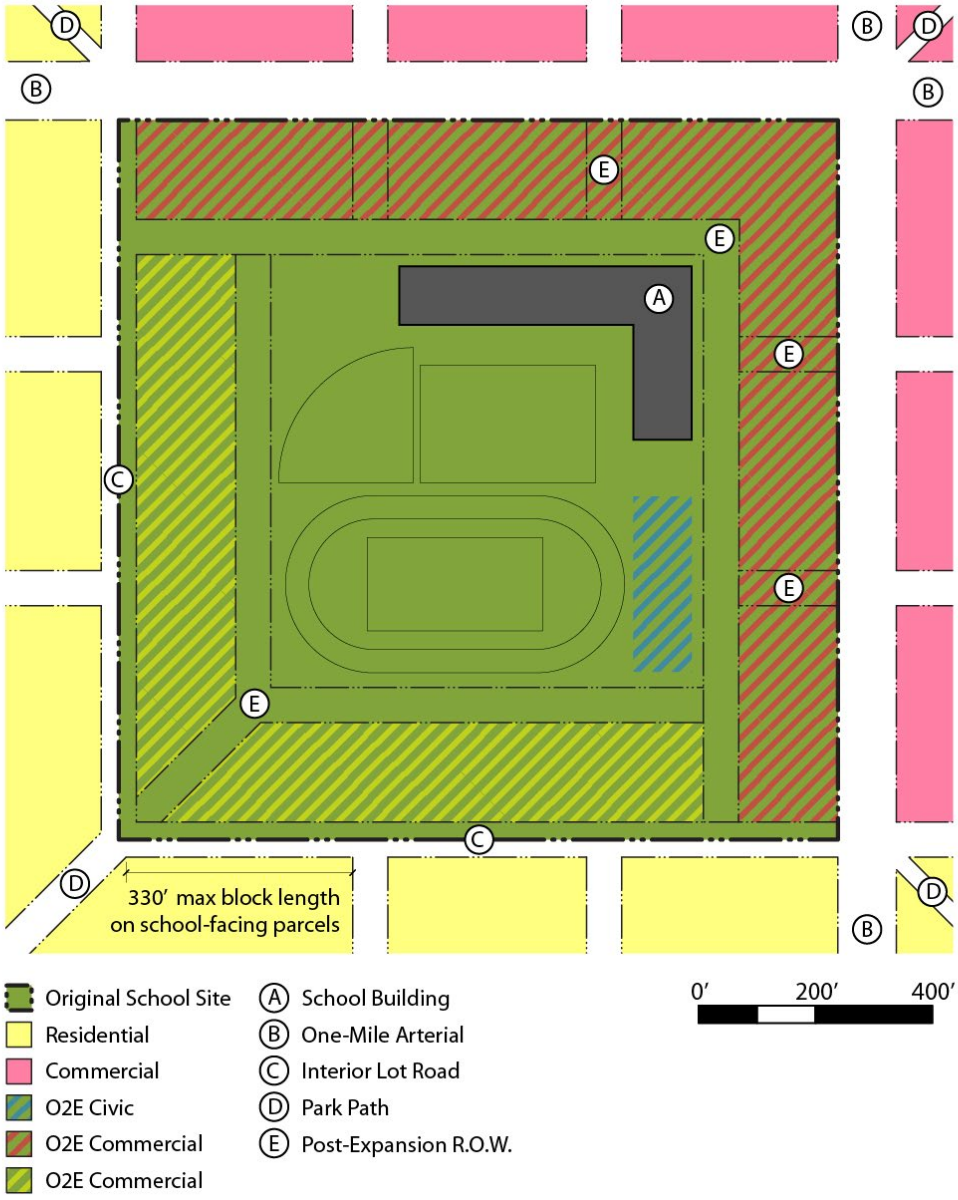


Figure 7.38: The 35-acre site of Ben Steele middle school configured to create park-front real estate and the option to expand.

POLICY RECOMMENDATIONS: INTER-JURISDICTIONAL COORDINATION

Chapter five explored the consequences of today's status quo development and the state of local inter-jurisdictional coordination. Through a series of interviews with city and school district officials, I found several areas in which coordination can improve.

Today, when a school district decides to build a new facility, it is common practice for school boards to appoint a city official to that facility's siting committee. This is a good practice and should be formalized. Chris Hertz, an engineer at the City of Billings sat on School District#2's siting committee for Medicine Crow and Ben Steele middle schools, and contributed considerable expertise to the process. City staff also informed the siting process for the new Gallatin High School in Bozeman, according to Chris Saunders, which lead the district to select a site closer-in to existing infrastructure, saving millions of dollars. But coordination with local school districts cannot begin and end with facility siting committees.

Though growth management plans often make mention of schools, they include no formal avenue for school district contribution to that document. The Billings-Yellowstone City-County Planning Board includes school district representatives as non-voting members. Chapter five of this report also discussed the role of new school facilities as "advanced scouts" for suburban sprawl (Beaumont & Pianca, 2002). Although new schools may not be built very often in each community, they represent significant opportunities to manage city-county growth. If school districts were given voting seats on planning boards, and expanded roles in the creation of local Growth Policy, not only would those policies be better informed, school districts would be better equipped to plan their own facilities and more apt to adhere to growth plans when new facilities are needed.

The Billings Subdivision Regulations document states that subdivisions cannot be rejected solely on the grounds that they do not adhere to growth policy or solely because a

school district objects their approval. If a subdivision is counter to both the goals of a growth management plan and is objected to by a school district. That should be sufficient grounds for rejection.

Local jurisdictions should coordinate to identify potential neighborhood centers in growing areas to co-locate schools, commercial destinations, and gradations of residential density. Chris Saunders told me of a commercial development of about 35 acres near Gallatin high school that he hopes will have the potential to become a neighborhood center.

Local jurisdictions should also come together around their shared interest in long-term fiscal solvency. The Bozeman area "Triangle Plan" is a good model for this. School districts, county and city governments should begin, as soon as possible, to plan for the 20-50-year maintenance liability of current county, and city growth. As stated in chapter five, consideration of the long-term outlook of providing and maintaining water, sewer and road systems to these areas is the proper role of government. Understanding the impacts of status quo development on the shared tax base of local governments should serve as a rallying point for local governments to take proactive action now.

The opportunity to coordinate city and school bus services also exists. Both the city and local school districts expend significant sums of money bussing students and citizens about the city. Cities and school districts should explore what savings might be gained by combining these services. The goal of an age-integrated city, where children use the same services as adults, and in so doing, gain independence, is the topic of extensive research by developmental psychologists (Lange, 2018). The possibility of children and parents riding busses together to schools which might serve as transportation hubs could be beneficial and should be explored in greater depth than this report allows.

FUNDING TOOLS

State enabling legislation requires that a Tax Increment Finance (TIF) structure be targeted to areas suffering from urban blight. Therefor it cannot be used in greenfield development applications. A substantial proportion of commercial use is also usually needed for a TIF to function properly.

Were statutes to change and become more like that of Texas, for example, such financing tools could be utilized to great effect. The Mueller master-planned community in Austin, TX used TIF financing in a 700-acre, primarily residential development anchored by a several commercial and office nodes to support residential construction costs. Nevertheless, the principal of a balance of uses and the creation of at least one recognizable neighborhood center has fiscal and social benefits across markets and geographies.

Though TIF financing would require state-level change, it would likely be more politically feasible on the local level because it would not raise taxes overall. An argument could be made that, if not for the TIF created in a School Zone, a greenfield area would develop to create the kind of environment known to have detrimental fiscal and health outcomes in the mid-to-long term.

A Special Improvement District, or SID, could be used, without any legislative changes, to fund some of the enhanced infrastructure a School Zone would require in city or county applications. The Lockwood Pedestrian Safety District (LPSD) was created in 2014 by voter referendum, passing by a margin of 11 percent (Lockwood Pedestrian Safety District) after a series of traffic injuries and deaths drove locals to action (Rogers, 2019). Funds from the special district have, in addition to educational and enforcement initiatives, been used to prepare a non-motorized transportation plan which was adopted by the

Billings MPO. The SID has also engineered and constructed almost a mile-and-a-half of sidewalk in Lockwood (Lockwood Pedestrian Safety District).

An SID as a funding tool for infrastructure in a School Zone may face some resistance from locals who can protest out of such districts. But many subdivisions wave the right to protest as part of their development agreement.

LIMITATIONS

On a recent Zoom call with my brother, he asked me what the Corona Virus pandemic would mean for American cities. He asked if dense places like New York City would not be built anymore in the U.S., or if urban centers might be abandoned all together. I replied that cities as dense or, in some cases, denser than New York like Seoul, South Korea, or Tokyo Japan have had far fewer COVID per capita deaths than the United States (Beech, 2020). I told him that the high death rate in our nation says more about our cultural attitudes toward collective action than it does about how we build our cities.

America, and, to a greater extent, Montana, reveres its cultural self-image as a nation of independent pioneers above the value of what we might achieve together through collective action. Even after the successes of the New Deal, World War Two, and a century of urbanization, our cultural discourse is, in many ways, mired in the Wild Wild West, where neighbors are few and land is abundant and impossible to waste. I worry that this cultural attitude will make our country ideologically incapable of meeting the challenges we face; that we will be unable to take proactive steps to combat Climate Change, or conserve Montana's rural heritage, or even save a child's life from being lost in another traffic crash.

In the “infinite game” of city and society-building, proactive planning and action are vital to success. But it is hard to plan for the future when it takes all your energy just to put dinner on the table. The same is true of any person, institution, or culture.

If the proposals made in this report never come to anything, it will not because anyone at a local planning department or school district is incompetent, lazy, or unimaginative; it will likely be for lack of capacity. Both cities and school districts are cash-strapped entities in Montana. A systemic lack of capacity to take proactive action or coordinate between jurisdictions is a major barrier to truly comprehensive planning in Montana. It is caused by a desire to “starve the beast” of government to the point where it is small enough to, in the words of conservative strategist, Grover Norquist, “drown in a bathtub.” If the government that results from this ideology is incapable of considering the 20-and-50-year, cumulative effects of ad hoc, market actors, it may be our children that we will starve and drown instead.

The aforementioned cultural and civic attitudes manifest themselves ways beyond the dearth of jurisdictional capacity at the local level, specific policy barriers will hamper some aspects of the School Zone as well.

Legislation changing the school walk zone to 1.5 miles rather than three would more accurately reflect a realistic walking distance for children in our state, but would also likely have disastrous effects on many school districts’ budgets. Montana annexation law creates non-sensical, overlapping jurisdictions with no connection to geographical or economic boundaries, and is overly deferential to the preferences of the individual, private landowner. Until laws governing annexation are brought into the 21st century, cities in Montana will be confined to reacting to growth, rather than planning for it.

As stated in chapter five, statute requiring that cities make no law that “applies to or affects” a school district is an impossible standard with which to comply. Until state and

local governments recognize both the effect of school districts on land use planning, which is the purview of city government, and the effect of land use planning on school districts, cohesive growth management cannot occur.

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